6901 WEST 63RD STREET, SUITE 407, OVERLAND PARK, KS 66202
PHONE: (913) 236-0006
FAX: (913) 236-0013

TECHLAW INC.

August 13, 2002 DCN: RR7-TLI-07YX-01-SP-0372

Mr. Thomas Lorenz
U.S. Environmental Protection Agency
Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101

Re: EPA Contract No. 68-W-01-051; EPA Work Assignment No. 07-YX
TechLaw Project No. RR7-K07; St. Louis (ex) Army Ammunition Plant
St. Louis, Missouri
Draft Sampling and Analysis Plan

Dear Mr. Lorenz:

Enclosed is the Draft Sampling and Analysis Plan (SAP) for TechLaw's oversight and split sampling activities at the St. Louis (ex) Army Ammunition Plant. All sample analysis and validation of samples will be performed by the U.S. Environmental Protection Agency Region 7, Environmental Services Division Laboratory in Kansas City, Kansas. As requested by you today, this Draft SAP has been submitted prior to completion of TechLaw's internal quality control review process.

If you have any questions, please call me at (913) 236-0006, extension 104, or Steve Bryant at extension 108.

Sincerely,

TechLaw, Inc.

Fred Molloy

Fred Molloy
Senior Project Manager

Enclosure

copy: Ernie Arnold, EPA Regional Quality Assurance Manager
Bob Dona, EPA Superfund Quality Assurance Coordinator
Robert Thielke, TechLaw Quality Assurance Officer
P. Brown-Derocher/Central Files
Document Control

U.S. Environmental Protection Agency
Regional Oversight Contract

Contract No. 68-W-01-051

St. Louis (ex) Army Ammunition Plant
SAMPLING AND ANALYSIS PLAN

DRAFT

REVISION 0

August 13, 2002

Work Perfomed by:

TechLaw, Inc.
14500 Avion Parkway
Suite 300
Chantilly, Virginia 20151

DCN: RR7-TLI-07YX-01-SP-0372

ST. LOUIS (EX) ARMY AMMUNITION PLANT

SAMPLING AND ANALYSIS PLAN

Submitted to:

U. S. Environmental Protection Agency
Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101

Submitted by:

TechLaw, Inc.
6901 West 63rd Street, Suite 407
Overland Park, Kansas 66202

Work Assignment No.:	07-YX
Contract No.:	68-W-01-051
Date Prepared:	August 13, 2002
Prepared By:	TechLaw, Inc. Steve Bryant (913) 236-0006 extension 108
TechLaw Project No.:	RR7-K07
EPA Primary Contact:	Thomas Lorenz
Telephone No.:	(913) 551-7292

Title: St. Louis (ex) Army Ammunition Plant
Field Sampling Plan

Date: August 13, 2002

EPA Contract No.: 68-W-01-051

EPA Work Assignment No. 07-YX

Submitted To:
Thomas Lorenz
EPA Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101
Telephone: (913) 551-7292

Submitted By:
TechLaw, Inc.
6901 West 63rd Street, Suite 407
Overland Park, Kansas 66202
Telephone: (913) 236-0006

Approvals:

_____ _____
EPA Work Assignment Manager Date

_____ _____
EPA Superfund Quality Assurance Coordinator Date

_____ _____
TechLaw Work Assignment Manager Date

_____ _____
TechLaw Quality Assurance Officer Date

RECORD OF CHANGES

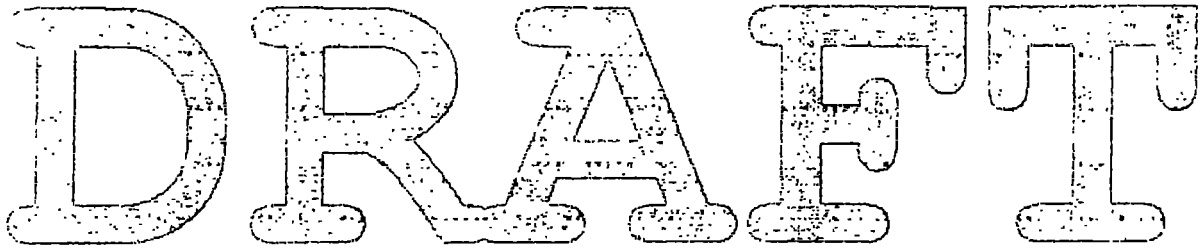
DCN	Revision No.	Revision Date	Comments
RR7-TLI-07YX-01-SP-0372	0	August 13, 2002	Initial FSP and QAPP

LIST OF ACRONYMS

ACM	Asbestos-containing materials
AMCOM	U.S. Army Aviation and Missile Command
ATSDR	Agency for Toxic Substance and Disease Registry
bgs	Below ground surface
BTEX	Benzene, toluene, ethylbenzene, and xylenes
DCN	Document Control Number
EBS	Environmental baseline survey
EPA	United States Environmental Protection Agency
ENSV	U.S. EPA, Region 7 Environmental Services Division Laboratory
FSP	Field Sampling Plan
GSA	U.S. General Services Administration
HAZWOPER	Hazardous Waste Operations and Emergency Response
HSP	Health and Safety Plan
LBP	Lead-based paint
LOE	Level of effort
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NESHAP	Nation Emission Standards for Hazardous Air Pollutants
NON	Notification of Noncompliance
PA	Preliminary Assessment
PCB	Polychlorinated biphenyls
PCDD/PCDF	Polychlorinated dibenzo-p-dioxins/ploychlorinated dibenzofurans
PFE	Plant Facilities and Engineering, Inc.
PPE	Personal protective equipment
PPM	parts per million
pCi/L	PicoCuries per liter
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
ROC	Regional Oversight Contract
SAP	Sampling and Analysis Plan
SLAAP	St. Louis (ex) Army Ammunition Plant
SLOP	St. Louis (ex) Ordnance Plant
SOP	Standard Operating Procedure
SVOC	Semi-volatile organic compound
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substance Control Act
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency

LIST OF ACRONYMS (continued)

UST	Underground storage tank
VOC	Volatile organic compound
WAM	Work Assignment Manager



ST. LOUIS (EX) ARMY AMMUNITION PLANT
SAMPLING AND ANALYSIS PLAN

PART I

FIELD SAMPLING PLAN

REVISION 0

Submitted to:

U. S. Environmental Protection Agency
Region 7
Superfund Division
Federal Facilities and Special Emphasis Branch
901 North 5th Street
Kansas City, Kansas 66101

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APPENDICES

A TechLaw Standard Operating Procedures

1.0 Introduction

Scope and Objectives

TechLaw, Inc. (TechLaw) has been tasked under Regional Oversight Contract (ROC) Number 68-W-01-051, Work Assignment Number 07-YX, to provide technical support to EPA, which includes oversight and split sampling activities, at the St. Louis (ex) Army Ammunition Plant (SLAAP) site, in St. Louis, Missouri for the Federal Facilities and Special Emphasis Branch.

The EPA Work Assignment Manager (WAM), Thomas Lorenz, has directed TechLaw to conduct oversight and split sampling to verify the quality of sampling and analysis performed by the U.S. Army Aviation and Missile Command (AMCOM)/U.S. Army Corps of Engineers (USACE) contractors related to the site-specific Environmental Baseline Survey (EBS). Oversight and split sampling activities will include the observation, documentation, and reporting of the collection of soil, water/oil mixtures, and concrete core sampling by AMCOM/USACE contractors at SLAAP.

As part of this investigation, TechLaw will collect data following standard EPA protocol and accepted industry practices. This document constitutes TechLaw's Field Sampling Plan (FSP) for oversight and collection of split samples during the EBS sampling events. This FSP will be used in conjunction with the TechLaw Quality Assurance Project Plan (QAPP) for this work assignment.

TechLaw anticipates a total of three sampling events at the SLAAP site between the months of August 2002 and September 2002, with the total number of sampling events being determined by written direction from the EPA WAM. TechLaw anticipates that the following number of samples will be collected during the course of the project: six soil split samples; six water/oil mixture split samples; and six concrete core split samples.

Site Description

SLAAP is owned by the U.S. Department of the Army and is currently under the command of AMCOM. Currently, eight of the original seventeen buildings associated with the 105-mm shell casing production are standing. The eight buildings are currently unoccupied.

The SLAAP site originally encompassed 21 acres of land on the northeastern portion of the St. Louis (ex) Ordnance Plant (SLOP) site. The site is located at 4800 Goodfellow Boulevard in St. Louis, Missouri. The area occupied by SLAAP was formerly owned by

General Electric Company/General Electric Realty Corporation from January 1926 to April 1941. The U.S. Army purchased the land in 1941 from General Electric Realty Corporation for the construction of SLOP, which was completed in 1942. SLOP was a 276-acre, small arms ordnance plant that produced 0.30- and 0.50-caliber munitions. In 1944, the northeast portion of SLOP, specifically 21 acres, was designated as SLAAP and converted from small arms munitions production to 105-mm Howitzer shell production. SLAAP was part of SLOP through 1944. Constructed between 1941 and 1942, Buildings 3, 5, 6, and 9 were used for 0.30-caliber munitions production until 1944.

The 21-acre plant was contract-operated by the Chevrolet Shell Division of General Motors Corporation. The Chevrolet Shell Division initiated the production of shells at the property in December 1944, with an accelerated schedule to produce 800,000 shells per month by June 1945. The conversion included altering Building 3 to produce 105-mm Howitzer shells; converting Building 5 to a headquarters and office building; converting Building 6 to additional office space and laboratory building; and converting Building 9 into an Acetylene Generator Building. In addition, Buildings 1, 2, 4, 7, 7A, 8, 8A, 10, 11, 11A, and 11B were constructed in 1944. These buildings were used for the following purposes:

- Building 1 - Billet Cutting Building;
- Building 2 - Forge Building;
- Building 4 - Air Compressor Building;
- Building 7 - Water Pump House;
- Building 7A - Cooling Tower;
- Building 8 - Fuel Storage Area;
- Building 8A - Oil Pump House;
- Building 10 - Quench Oil Storage Tank;
- Building 11 - Foamite Generator Building; and
- Building 11A and 11B - Hose Cart Shelters.

In 1985, portions of Buildings 3, 5, and 6 were converted into office space. The production machinery remained on the property until it was removed in 1989. In 1998, these buildings were vacated.

Several environmental investigations including a site-wide EBS and several removal actions have been conducted at SLAAP. The site-wide EBS was conducted in 2000 to determine the environmental condition of the property, prior to transfer, outgrant, or disposal. Tetra Tech EM, Inc., prepared the site-wide EBS for AMCOM. These activities are discussed below.

Underground Storage Tanks Investigation and Removal

The site-wide EBS indicated that six underground storage tanks (USTs) were installed and used at SLAAP. The six USTs included three steel quench oil tanks; one concrete sludge pit; and two steel gasoline tanks. The quench oil tanks ranged in capacity from 14,000 to 15,000 gallons; the sludge pit had a volume of approximately 10,000 gallons; and the gasoline tanks had capacities of approximately 6,000 and 11,000 gallons. The quench oil tanks were located east of Building 3 and were used to supply oil to the 14 quench tanks used in the production of 105-mm Howitzer shells. The concrete sludge pit was installed next to the quench oil tanks in 1944 and received used quench oil from Building 3. Residue settled out of the used quench oil in the pit before the oil was reused. The 6,000-gallon gasoline UST was used to fuel vehicles and other gasoline-powered equipment at SLAAP with regular (leaded) gasoline. The site-wide EBS stated that in 1969, the contents of the USTs were removed and the quench oil tanks, sludge pit, and 6,000 gallon gasoline tank were filled with water. One additional 10,000-gallon gasoline UST that had been installed west of Building 2 in 1945 was reportedly abandoned in-place in 1959 by filling with sand. USACE performed an investigation and evaluation of USTs in 1989 at SLAAP.

An investigation of the USTs was conducted in 1992 by J.D. Chelan in preparation for their removal. The investigation included sampling of the UST contents, installation of 12 soil borings, and collection of subsurface soil samples. Analysis of the UST contents revealed that each quench oil tank contained mostly water, with 1 to 2 percent oil and sludge material. The sludge pit contained water and approximately 5 percent oil and sludge. The 6,000 gallon gasoline tank was filled almost entirely with water, and the 10,000 gallon gasoline tank contained a mixture of 25 percent water and 75 percent coal-like fines. The liquids in the USTs were analyzed and found to contain no polychlorinated biphenyls (PCBs), while the analysis of the solids revealed low concentrations of metals. Total petroleum hydrocarbons (TPHs) ranged from 11 to 6,530 parts per million (ppm) in the subsurface soil samples. The highest TPHs concentrations were detected in samples collected from 13 to 17 feet below ground surface (bgs) around the quench oil tanks. The sample collected near the 6,000 gallon gasoline tank at 7 feet bgs revealed TPHs at a concentration of 491 ppm. The site-wide EBS stated that one surface soil sample collected from a pipe north of the 6,000 gallon gasoline tank contained a red "Solvent-like" material. Analysis of the sample revealed BTEX compounds at a concentration of 477,200 ppm. This pipe led from the gasoline UST to the gasoline dispensing pump and is embedded in the structural concrete foundation.

UST removal activities were conducted in 1992. Prior to the removal, approximately 2,300 gallons of the water and oil mixture was pumped from the tanks and transported to an oil recycling facility. The USTs and 1,500 cubic yards of contaminated soil were removed and

subsequently disposed. Confirmation samples collected from the excavation indicated that further remedial action was required. An additional 300 cubic yards of contaminated soil was removed and disposed. Closure of the SLAAP UST sites is pending.

Polychlorinated Biphenyls

Oils containing PCBs were used at SLAAP in machining processes. The site-wide EBS identified that the PCB-containing oil, which was called "soluble oil," was used primarily as a coolant in the milling, lathing, and smoothing processes in Building 3. PCBs were also used in hydraulic oils and transformers found throughout the site. The soluble oil was circulated from the soluble oil and mixing room on the first floor of Building 3 to the machinery on the first and second floors by overhead lines. These lines then fed oil through pipe drops to individual machines.

PCBs were first detected at SLAAP in creosote-treated wood flooring blocks that were removed during Building 3 renovation activities in March 1991. The initial sampling was performed by the U.S. General Services Administration (GSA) in April 1991. In May 1991, after additional sampling and analysis of the creosote-treated wood blocks, EPA Region 7 issued a notification of noncompliance (NON) to SLAAP under the authority of the Toxic Substances Control Act (TSCA). From September 1991 through August 1994, Rust Remedial Services, Inc., performed decontamination activities and confirmatory sampling on the first and second floors of Building 3. The corrective action consisted of removal of PCB-contaminated wood blocks, concrete floors, and block walls on the first and second floors of the building. As part of the remedial approach for Building 3, a health-based risk assessment was completed in June 1996 (Woodward Clyde-Consultants) to determine risk-based clean up levels for the basement and the first and second floors of Building 3. The risk assessment conducted by Woodward Clyde-Consultants concluded that the concentrations of contaminants of concern did not present an imminent threat to human health and the environment. The Agency for Toxic Substance and Disease Registry (ATSDR) did not endorse the health-based risk assessment, and the issue of the NON is currently unresolved. EPA will make a final determination upon the completion of the risk assessment and remedial activities conducted by the Army.

Pesticides

Soil and surface wipe samples collected in the basement of Building 3 in June 1994 by Dames & Moore contained pesticides, including 4,4-DDE; 4,4-DDD; 4,4-DDT; dieldrin; endrin; heptachlor epoxide; and gamma-BHC. The origin of the pesticides was not identified in the site-wide EBS. The risk assessment, completed by Woodward Clyde-Consultants in

June 1996 for PCBs, included the identified pesticides. The risk assessment concluded that pesticides in the basement of Building 3 do not pose an unacceptable risk.

Asbestos-Containing Materials

An asbestos-containing material (ACM) survey was conducted at SLAAP in June and July 1991 by Plant Facilities and Engineering, Inc. (PFE). Corrugated siding (ACM) was used on Buildings 1, 2, 3, 4, 5, and 6; building crossovers; and the western guard shack. ACM was also found in stock items consisting of packing and gasket material in Building 4 and was identified in the thermal system insulation on abandoned pipelines in Buildings 4A, 7, and the basements of Buildings 3, 5, and 6. The floor tile and mastic in Buildings 3, 5, and 6 contained nonfriable ACM. Both friable and nonfriable ACM were found throughout the buildings at SLAAP. ACM will be addressed under National Emission Standards for Hazardous Air Pollutants (NESHAP) regulations. ACM in Building 3 will be removed prior to demolition of Building 3. The disposition of ACM in other buildings at SLAAP has not been determined.

Lead-Based Paint

In 1993, a Preliminary Assessment (PA) screening was conducted at Building 3 for lead-based paint (LBP) by U.S. Army Environmental Hygiene Agency (USAEHA) because of the age of the building and as a result of previous sampling conducted in April 1992. The screening report cites a potential human health and environmental threat associated with LBP at the site.

Radon

A radon survey was conducted in the basement of Buildings 3, 5, and 6 by PFE from December 1991 to June 1992. Army Regulation 200-1 requires that mitigation be undertaken if the average annual radon concentration in a structure exceeds 4 picoCuries per liter (pCi/L) of air. The investigation report indicated that radon concentrations in the basement of Buildings 3 and 6 did not exceed 4 pCi/L of air. However, the basement of Building 5 had an overall average radon concentration of 5.29 pCi/L.

2.0 Project Organization and Responsibilities

Distribution List

The following EPA Region 7 personnel and TechLaw personnel will receive copies of the approved FSP and any addendums.

- **EPA Region 7**
  Thomas Lorenz, Work Assignment Manager
  Ernie Arnold, EPA Regional Quality Assurance Manager
  Bob Dona, Superfund Quality Assurance Coordinator

- **TechLaw**
  Steve Bryant, Work Assignment Manager
  Keith Slider, Environmental Scientist
  Robert Thielke, TechLaw Quality Assurance Officer

Responsibilities

The various quality assurance, field, laboratory and management responsibilities of key project personnel are defined in the attached QAPP, Section A4 and Figure A4. At the direction of the EPA WAM, TechLaw will perform project management, conduct the field investigation, conduct a review of analytical results, and prepare the Sampling and Analysis Reports for this project.

3.0 Sampling Procedures

Split Sampling

TechLaw will collect split samples of AMCOM/USACE contractor's samples which must be collected as required by their EPA-approved SAP. The EPA WAM will direct TechLaw in the determination of which samples to split with the potential that split samples will include soil, water/oil mixtures, and concrete core samples. Water/oil mixture samples are to be collected by AMCOM/USACE contractor personnel from selected sewer manholes located on-site by lowering sampling equipment from the surface to the desired sampling depths. Concrete core samples are to be collected by AMCOM/USACE contractor personnel from the surface of concrete slabs in selected buildings. Subsurface soil sampling will be conducted by AMCOM/USACE contractor personnel throughout the site by the use of direct-push technology or hand auger techniques.

For each split sample, TechLaw will provide AMCOM/USACE contractor personnel with sample containers immediately before sample collection and will document the sample collection procedure. AMCOM/USACE contractor personnel will fill TechLaw's sample containers from the same sample location as the AMCOM/USACE sample, and the TechLaw container will be handed to TechLaw personnel for labeling, sealing and preservation according to Table 2.

Analytical Methods

Split samples will be analyzed for: volatile organic compounds (VOCs); semi-volatile organic compounds (SVOCs); polychlorinated biphenyls (PCBs); and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF). A sample collection summary is provided in Table 1; additionally, a summary of analytical methods is provided in Table 3. Split samples will be analyzed by the EPA Region 7 Environmental Services Division (ENSV) Laboratory.

Currently, no field analytical measurements are planned for this project. In the event that the EPA WAM requests field measurements to be collected, this FSP will be amended to incorporate appropriate SOPs and the QAPP will include appropriate quality assurance (QA) measures.

Field Quality Control Samples

To meet the data quality measurement objectives established by the analytical methods, TechLaw will collect field quality control (QC) samples to assess the precision and accuracy of field collection procedures for confirmation samples. Laboratory QA and QC samples, as required by each analytical method are provided in the QAPP.

The frequency of field QC samples is provided in Table 1, and will be as follows:

- One field duplicate for every 10 or fewer samples of a given matrix;
- One matrix spike/matrix spike duplicate (MS/MSD) for every 20 or fewer samples of a given matrix; and
- One field blank for every 10 or fewer soil/oil mixture samples collected.

Field duplicates will be collected directly from the sample matrix and will be analyzed for the same constituents as the sample. The field duplicates will be assigned a different sample

designation than the sample being duplicated, to ensure that the field duplciate is "blind" to the laboratory.

Samples collected as MS/MSD samples will be collected as double volume from the sample matrix. All MS/MSD samples will be identified on the respective sample chain-of-custody form.

No equipment blanks are proposed to be collected from AMCOM/USACE contractor sampling equipment.

4.0 Sample Documentation, Custody, and Shipment

Documentation of all field sampling activities will be recorded according to the QAPP, Section B3 and TechLaw Standard Operating Procedure (SOP) No. 03-01-02, *Field Documentation Procedures - Maintenance of a Field Logbook* and TechLaw SOP No. 03-02-02, *Field Documentation Procedures - Taking and Documenting Photographs*. Sample chain-of-custody forms will be completed for all samples according to the QAPP, Section B3 and TechLaw SOP No. 02-05-01, *Field Procedures - Chain-of-Custody*. TechLaw SOPs that are referenced are included in Appendix A of this FSP.

5.0 Decontamination and Waste Management

Because TechLaw will only be collecting split samples, it is unlikely that any equipment decontamination will be necessary. However, if decontamination of sampling equipment is necessary, it will be undertaken according to the QAPP, Section B2, and TechLaw SOP No. 02-03-01, *Field Procedures - Equipment Decontamination,* included in Appendix A of this FSP. All sampling equipment will be decontaminated before sample collection and will be decontaminated after sample collection with an Alconox® soap wash, a potable water rinse, and a de-ionized water rinse.

All wastes generated by TechLaw during sampling activities will be managed according to the QAPP, Section B2. All decontamination solutions will be collected in a five-gallon, plastic bucket for transport to the appropriate on-site AMCOM/USACE contractor decontamination pad. TechLaw will notify the EPA WAM for subsequent notification to AMCOM/USACE contractor when transport of the decontamination water is conducted.

Personal protective equipment (PPE) used during sample collection will include Tyvek® disposable coveralls, nitrile sampling gloves, disposable boot covers, and paper towels. TechLaw will accumulate all PPE in a plastic trash bag for subsequent transport to the AMCOM/USACE contractor accumulation point. TechLaw will notify the EPA WAM for subsequent notification to AMCOM/USACE contractor when transport of PPE is conducted.

6.0 Health and Safety

A TechLaw Health and Safety Plan (HSP) for field sampling activities will be developed by TechLaw and approved by the TechLaw Deputy Health and Safety Director. All TechLaw field sampling personnel will meet all training requirements established under 29 CFR 1910.120, including 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training.

7.0 Project Schedule and Deliverables

TechLaw anticipates that preliminary analytical results will be provided by the EPA Region 7 ENSV Laboratory within 14 days of each sampling event with results being forwarded to the EPA WAM as draft data. TechLaw anticipates that complete validated data packages will be available within 30 days of each sampling event. The EPA Region 7 ENSV Laboratory will conduct validation of the analytical results. TechLaw will complete a data review and submit Sampling and Analysis Reports within 10 days of receiving the complete analytical data package for each sampling event. These reports will include the following:

- Summary table of all sampling performed;
- Comparison of analytical results with AMCOM/USACE sample results, if applicable;
- Sample location map;
- Photograph log of all sampling locations;
- Quality assurance section; and
- Photocopies of field logs.

Verbal updates of field sampling activities will be provided to the EPA WAM on a daily basis when the TechLaw team is performing sampling in the field and the EPA WAM is not present. Monthly progress of sampling activities, including level-of-effort (LOE) hours expended for sampling, will be included in the Monthly Work Assignment Status Report submitted to the EPA WAM.

TechLaw will be the custodian for all documents and file materials generated by TechLaw under this FSP, including: all relevant records, reports, logs, field notebooks, photographs and film negatives, laboratory data results, laboratory QA reports, and sample custody documentation. TechLaw will maintain all files in a secured, limited access area within the TechLaw Overland Park, Kansas Office. Additionally, the TechLaw WAM and the TechLaw Project Quality Assurance Coordinator will maintain a working file during the course of the project according to the TechLaw Document Control System established under the TechLaw Quality Assurance Program Plan. All files will be packaged and transported to the EPA Region 7 upon closeout of the work assignment.

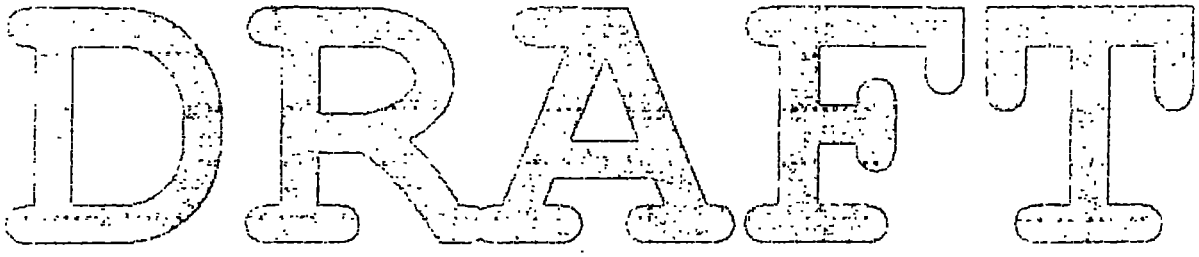

Table 1
Sample Collection Summary

Matrix	Area*	Estimated No. of Locations*	Sample Depths	Field Parameters	Analytical Parameters	Field Duplicates	MS/MSDs	Field Blanks
Soil	Site-wide (soil borings and trenches)	6	Variable	**	Low-level VOCs, SVOCs, PCBs, PCDD/PCDF	1	1	1
Water/oil mixture	Site-wide (sewer manholes or monitoring wells)	6	Variable	**	VOCs, SVOCs, PCBs, PCDD/PCDF	1	1	1
Concrete Cores	Site-wide (interior building locations)	6	Surface	**	SVOCs, PCBs, PCDD/PCDF	1	1	0

* Exact sampling area/location to be determined by the EPA WAM.
** To be recorded from AMCOM/USACE contractors' field data.

Table 2
Sample Volumes, Containers, Preservation, and Handling

Matrix[a]	Parameter	Container [b]	Preservation and Handling
Soil	Low-level VOCs	2, 40-ml VOA vials, Teflon lid	Cool to 4°C; sodium bisulfate
	SVOCs	8-ounce glass jar	Cool to 4°C
	PCBs	8-ounce glass jar	Cool to 4°C
	PCDD/PCDF	8-ounce glass jar	Cool to 4°C
Water/oil mixture	VOCs	2 - 40 ml VOA vials, Teflon lid	HCl to pH<2, no head space, Cool to 4°C
	SVOCs	8-ounce glass jar	Cool to 4°C
	PCBs	8-ounce glass jar	Cool to 4°C
	PCDD/PCDF	8-ounce glass jar	Cool to 4°C
Concrete Cores	SVOCs	8-ounce glass jar	Cool to 4°C
	PCBs	8-ounce glass jar	Cool to 4°C
	PCDD/PCDF	8-ounce glass jar	Cool to 4°C

a. All split samples will be collected site-wide as directed by the EPA WAM.
b. Double volume is required for samples submitted for matrix spike/matrix spike duplicate blanks.

Table 3
Analytical Methods

Matrix	Parameter	Analytical Method [a]	Holding Time (Extraction/Analysis)
Soil	VOCs	8260B	14 days
	SVOCs	8270	14 days/40 days
	PCBs	8082	14 days/40 days
	PCDD/PCDF	8290	30 days/45 days
Water/oil mixture	VOCs	8260B	14 days
	SVOCs	8270	7 days/40 days
	PCBs	8082	7 days/40 days
	PCDD/PCDF	8290	30 days/45 days
Concrete Cores	SVOCs	8270	14 days/40 days
	PCBs	8082	14 days
	PCDD/PCDF	8290	30 days/45 days

a. Analytical methods are presented in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, Third Edition* (June 1997)

FIELD PROCEDURES -
EQUIPMENT DECONTAMINATION

SOP Number: 02-03-01
Effective Date: 03/02/99

Technical Approval: David M. Welch Date: 8/19/99

QA Management Approval: John W. Goode Date: 8/26/99

SOP Description

This Standard Operating Procedure (SOP) establishes the procedures to be used by TechLaw staff when decontaminating and cleaning sampling equipment in the field. This SOP supports field work associated with government and commercial clients. Although these procedures are applicable to most situations encountered in the field, special situations may arise where deviations may be necessary. In either case, the specific decontamination and cleaning procedure must be outlined in the site-specific sampling and analysis plan (SAP) and/or quality assurance project plan (QAPjP). Changes due to emergency or unforeseen situations arising in the field should be thoroughly documented in the field logbook and approved by the field team leader.

General Procedures

Related SOPs

This SOP is to be used in conjunction with the other relevant and applicable SOPs found in the following SOP categories:

Section No.	Section Title
01	General Procedures
02	Field Procedures
03	Field Documentation Procedures
04	Packaging and Shipping Procedures
05	Field Equipment Operation and Maintenance Procedures
06	Groundwater Sampling/Monitoring and Analysis Procedures
07	Soil/Sediment Sampling and Analysis Procedures
08	Surface Water Sampling and Analysis Procedures
09	Health and Safety Procedures
11	Quality Assurance Procedures
12	Incineration/BIF Sampling and Analysis Procedures
13	Waste Sampling and Analysis Procedures

Equipment and Apparatus

- Dish pans and/or wash tubs
- Scrub brushes
- Phosphate-free laboratory detergent (e.g., Liqui-Nox®)
- Solvent and/or acid rinse solutions (as required)
- Plastic sheeting
- Metal racks and/or sawhorses (as needed for large equipment)
- Drums or other receptacles (for wash/rinse wastewaters and used plastic sheeting)
- Squeeze bottles and/or pump sprayers
- Aluminum foil

General Requirements

Decontamination Procedure Selection

The specific decontamination procedure required for a project depends upon several factors.

- **The EPA Region in which the Project Is Being Conducted** - This is the first consideration in selecting the proper decontamination procedure. Some regions (e.g., EPA Regions IV and V) require more strict decontamination procedures than other regions (e.g., EPA Regions I and VI). The decontamination procedure for any TechLaw project must be selected with this in mind. If no specific decontamination procedure is required by the Agency or commercial client for the region in which the project is being conducted, then the TechLaw basic decontamination procedure described in this SOP will be sufficient. However, if a more stringent procedure is required, it must be included in the project site-specific SAP and/or QAPjP.

- **The Level of Data Quality Required** - The level of data quality required for successful completion of the project is the second consideration in selecting the proper decontamination procedure. All sampling and field equipment must be cleaned in accordance with the procedure which meets the minimum requirements established for the Data Quality Objectives (DQOs) for the project. DQOs are qualitative and quantitative statements which specify the quality of data required to support decisions based on the intended use of the data. DQOs provide information on the limits of the data, which in turn, dictate the proper uses of the data. DQO levels are numbered I through V, with I being the lowest and IV the highest quality data. Level V data are collected using special or non-standard methods. For example, DQO Level I includes samples collected for field screening properties (e.g., pH, specific conductance, and temperature). The TechLaw basic decontamination procedure presented in this SOP is suitable for achieving this level of data quality. In contrast, DQO Level IV includes samples collected for trace organic and metals analyses. The decontamination procedure required for this level of data quality may encompass one of the EPA regional procedures listed in later sections of this SOP. Higher quality methods may be substituted for lower level work.

- **The Nature of the Project** - The third consideration in selecting the proper decontamination procedure is the nature of the project (e.g., full-scale investigation versus oversight activities). Large-scale projects involving intensive sampling by TechLaw personnel will usually require the use of a stringent decontamination procedure. In a situation such as this, the sampling team is responsible for supplying and decontaminating the sampling equipment. However, in oversight situations where EH&S personnel are only responsible for the collection of split samples, the required decontamination procedure may be minimal, and may be the same as the facility's contractor, or none at all. A decontamination procedure usually is limited for oversight projects since the facility's contractor is responsible for providing the sampling and decontamination equipment.

Equipment and Apparatus

A sufficient quantity of clean equipment should be transported to the field so that an entire study can be conducted without the need for field cleaning. However, this is not always possible for some specialized items of field equipment (e.g., portable power augers, drilling rigs, and other large pieces of equipment). In addition, it may not be practical or possible to transport to the field all of the necessary pre-cleaned field

equipment required for large-scale investigations. Consequently, the procedure for cleaning and decontaminating the sampling equipment must be determined prior to beginning work in the field. The methods for cleaning sampling equipment in the field must be described in detail in each project SAP and/or QAPjP. The standard procedures (i.e., TechLaw as well as EPA region-specific) for cleaning this equipment in the field are contained in this SOP.

The Use of Solvents

As a general rule, it is preferable to keep the decontamination procedure as simple as possible. The use of solvents (e.g., pesticide-grade acetone, methanol, isopropanol, and hexane) and acid rinses (e.g., hydrochloric and nitric acid) should be discouraged, if at all possible. Solvents and acid rinses should be avoided because they are messy to use in the field and are at risk of being spilled. Furthermore, they are considered by the Department of Transportation (DOT) as hazardous material and must be shipped to, and from, the field as hazardous material/dangerous good subject to the DOT and UN ICAO/IATA regulations. See SOP Nos. 04-04-XX and 04-05-XX for further details regarding the packaging and shipping of hazardous materials/dangerous goods. Finally, the spent materials may be determined to be hazardous wastes, which require manifesting and off-site shipment to a treatment, storage, or disposal (TSD) facility. See SOP No. 02-04-XX for Management of Investigation Derived Waste. Consequently, the use of solvents and acid rinses should be avoided unless specifically required by EPA or other regulatory agencies.

If solvents must be used in the field, only the smallest volume required to complete the field activities should be used to minimize the volume of solvents to be disposed. Solvents should be selected based upon the project analytical parameters of interest and risk. For example, acetone should not be selected as a decontamination solvent if it is one of the analytical constituents of concern. Methanol is more toxic than either isopropanol or acetone and should be avoided. Furthermore, hexane and petroleum ether are not miscible with water which limit their use as rinsing agents. Although hexane is frequently used to remove contaminants from sampling equipment which are not easily removed by other solvents, it is preferable to avoid using hexane and replace the contaminated equipment with new equipment.

Sample Containers

Sample containers do not need to be cleaned in the field as they will be purchased pre-cleaned and certified from the analytical support laboratory or an independent container supplier (e.g., I-Chem or Eagle Picher).

Use of Phosphate-Free Laboratory Detergent

The detergent used in the field should consist of a standard brand of phosphate-free laboratory detergent such as Liqui-Nox®. The use of other detergents such as a commercial phosphate-free dishwashing or laundry detergent is discouraged. Those detergents may only be used if they are clearly specified and approved in the SAP, and documented in the field logbooks and any reports produced.

Water Source

Tap water may be obtained from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute for tap water. Water shall not be used to decontaminate field equipment unless the source of the water is known.

Deionized (DI) water is defined as tap water that has been treated by passing through a standard deionizing resin column. The DI water should contain no heavy metals or other inorganic compounds (i.e., at or above analytical detection limits). Laboratory grade DI water is suitable for these purposes.

Organic-free water is defined as tap water that has been treated with activated carbon and deionizing units. Laboratory DI water does not qualify as an organic-free water substitute; however, commercial HPLC-grade water is usually acceptable provided the supplier has performed analysis on the water and can provide the certificates of analysis. Organic-free water should contain no pesticides, herbicides, extractable organic compounds, and less than 5 $\mu g/\ell$ of purgeable organic compounds. During cleaning operations, the substitution of a higher grade water (i.e., DI or organic-free water for tap water) is permitted and need not be noted in the field logbook as a variation of this SOP. The substitution of a lower grade water is not permitted.

Post-Sampling Requirements

Prior to departing the field at the conclusion of the sampling activities, all sampling equipment should be cleaned on site after final use, unless circumstances prohibit. The date of decontamination must be clearly marked on the equipment (usually on wrapping materials or tags attached to the equipment), along with information stating whether solvent and/or acid rinses were used.

All spent solvents, acid rinse solutions, detergent washwaters, and rinse waters used to clean equipment shall not be reused, unless specifically permitted in the SAP. Advance arrangements should be made for disposal of all cleaning wastes. If an operating waste water treatment plant is present at the facility, decontamination solutions may be disposed of in the plant influent with permission of the facility. Permission may also be requested to dispose of solvents and acid rinse solutions into the facility's laboratory waste containers. Regardless of the method of disposal, permission should be obtained from the facility prior to arriving on site.

If a disposal system is not available locally or if permission to use on-site facilities cannot be obtained, containerize the solutions for later shipment and obtain a sample of each container for laboratory analysis. The containers must be secured so they may be stored until the analytical results are available. Arrangements for disposal should be made prior to departing the facility, if at all possible. Refer to SOP No. 02-04-XX for further information regarding the management and disposal of investigation-derived wastes.

Sampling Equipment Cleaning Procedures

The recommended TechLaw basic decontamination procedure is listed below. At a minimum, this procedure should be followed for all investigatory activities at hazardous waste sites. In several EPA regions, more stringent decontamination procedures are required where Level IV DQOs are specified. For regions where standard operating decontamination procedures exist or where typical decontamination procedures are known, they are listed. Also, a preferred decontamination procedure is listed for the EPA regions where standard operating and/or typical decontamination procedures are not available. The TechLaw basic decontamination procedure should be used under all circumstances except where a more stringent procedure is required by EPA, state, or other regulatory agencies.

- Upon arriving at the site, establish an equipment decontamination area. Refer to Attachment A for a typical decontamination area layout. This area should be upwind and

away from sources that might contaminate the cleaned equipment. If a decontamination pad has been constructed for the investigation, conduct the decontamination activities over the pad.

- Cover the working surface with large plastic (polyethylene) sheets. Establish separate areas for contaminated equipment storage, contaminated equipment wash, equipment rinse (including solvent rinses if required), equipment drying, clean equipment storage, cleaning supplies storage, and contaminated wash and solvent solution storage.

- Place dish pans and/or wash tubs on the plastic sheets in the required wash and rinse sequence. Fill the first wash tub with a phosphate-free detergent (e.g., Liqui-Nox®) and tap water solution for washing contaminated equipment. The remaining dish pans and/or wash tubs should remain empty; these pans are used for collecting rinse solutions.

- Fill the squeeze bottles and/or pump sprayers with the tap water and deionized water rinse solutions. If solvents, acid rinses, and organic-free water rinses are required by the regulatory agencies, fill the squeeze/sprayer bottles with these solutions.[1] Place each rinse solution (e.g., tap water, deionized water, solvent, acid rinse) in a separate container; never mix uncontaminated rinse solutions in the same container. Hold the squeeze bottles or pump sprayers over the dish pans/wash tubs while pouring the solutions to collect any spillage which may occur during the process.

- Put on clean gloves and begin decontaminating the equipment.

- Wash the contaminated equipment in the first wash tub filled with a phosphate-free detergent (e.g., Liqui-Nox®) and tap water solution, using scrub brushes, if necessary, to remove particulate matter and surface films. The detergent solution should be replaced when it becomes visibly contaminated and fails to effectively clean the equipment.

- Rinse the equipment thoroughly over the second wash tub with tap water. The water may be dispensed from the squeeze bottles or pump sprayers.

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1 Several EPA regions require that solvents, acid rinses, deionized water, and organic-free water be dispensed from non-interfering glass, Teflon®, or stainless steel containers; plastic containers are usually not approved for these solutions. If these solutions must be used in the decontamination sequence, refer to the specific requirements for the EPA region in which the work is being conducted.

- Rinse the equipment thoroughly over the third wash tub with deionized water. If preferred, the deionized water rinse can also be conducted over the second wash tub since water is used as the rinsing agent in both cases.

- Place the decontaminated equipment on clean plastic sheeting and allow it to completely air dry.

- Wrap the equipment with aluminum foil or clean plastic, if appropriate, to prevent contamination of the equipment if it is going to be stored or transported.

- Clean small equipment (e.g., sampling dishes/pans, stainless steel spoons, split-spoon samplers, and shelby tubes) by submerging the equipment directly into the detergent-filled wash tub. Clean large equipment (e.g., power augers, drill rods, drill bits, and auger flights) by supporting the equipment on metal racks and/or sawhorses over the decontamination pad or plastic sheeting.

- Dispose of all spent decontamination solutions into the facility wastewater treatment system influent, or containerize the solutions into drums or other receptacles for later disposal. If the solutions are containerized, collect a sample of each solution for waste characterization. Secure the containers so they may be stored until the analytical results are available. If possible, finalize disposal arrangements prior to leaving the site. Refer to SOP No. 02-04-XX for further information regarding the management and disposal of investigation-derived wastes.

- Dispose of the used plastic sheeting by placing it into a drum or other receptacle for later disposal.

- Store all cleaned field and sample equipment in a contaminant-free environment.

EPA Regional Decontamination Variations

The cleaning and decontamination procedure selected for use in the field should contain as few steps as possible to acquire agency approval. The use of solvents in the field should be discouraged at all times if possible. In all cases, the above-listed basic decontamination procedure should be used. However, many EPA regions require that a more stringent and specific decontamination procedure be followed for investigations conducted in their specific regions. Furthermore, EPA usually requires that a more stringent decontamination procedure be followed when Level IV DQOs are required.

This section of the SOP contains the known Level IV DQO decontamination procedures required or accepted by the various EPA regions. In regions where a published and approved decontamination procedure exists, the region-specific SOP is listed. For regions which do not have established standard decontamination procedures, a typical or preferred procedure is listed. Typical procedures are those observed by TechLaw personnel to be generally accepted by EPA in that specific region. Preferred procedures are listed where the typical procedures are not known, or were not published. The preferred procedures were derived from existing EPA guidance documents.

EPA Region I:

Preferred Procedure: Region I has no known published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

For organics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Pesticide-grade hexane or methanol* rinse;
- Reagent-grade acetone* rinse;
- Organic-free reagent water rinse; and
- Air dry.

* Isopropanol may be substituted as the solvent if hexane, methanol, or acetone are constituents of interest.

For inorganics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Dilute hydrochloric or nitric acid rinse;
- Reagent water rinse; and
- Air dry.

Source: U.S. Environmental Protection Agency, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001, November, 1992.

EPA Region II:

State of New York Standard Operating Procedure:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- 10 percent ultrapure nitric acid* rinse;
- Tap water rinse;
- Methanol** rinse;
- Acetone** rinse;
- Methanol** rinse;
- Deionized water (analyte-free) rinse; and
- Air dry.

* The nitric acid rinse may be omitted if metals are not analyzed.

** The methanol-acetone-methanol sequence may be substituted with isopropanol-hexane-isopropanol if acetone is a constituent of concern.

Source: New York State Department of Environmental Conservation, Division of Hazardous Substances Regulation, RCRA Quality Assurance Project Plan Guidance, Appendix E, 1991.

EPA Region II Standard Operating Procedure:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- 10 percent ultrapure nitric acid* rinse;
- Tap water rinse;
- Acetone only, or methanol followed by hexane** rinse;
- Analyte free water rinse; and
- Air dry.

* The nitric acid rinse may be omitted if metals are not analyzed.

** The solvent rinse may be omitted if volatile organics are not analyzed.

Source: U.S. Environmental Protection Agency, Region II CERCLA Quality Assurance Manual, U.S. EPA Region II Environmental Services Division, Revision No. 1, October 1989.

EPA Region III:

Typical Procedure: Region III has no known published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Deionized water rinse;
- Pesticide-grade solvent* rinse;
- Deionized water rinse; and
- Air dry.

* Nitric acid should be used for metals analysis; acetone, methanol, or hexane should be used for organics analysis.

Source: TechLaw experience in EPA Region III, and approved Region III RFI Work Plans.

EPA Region IV:

Standard Operating Procedure:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Deionized water rinse;
- Double rinse with pesticide-grade isopropanol*;
- Organic-free water** rinse; and
- Air dry.

* The standard cleaning solvent is isopropanol; other solvents (e.g., acetone or methanol) may be substituted as site conditions warrant.

** Organic-free water is defined by EPA Region IV as tap water that has been treated with activated carbon and deionizing units, and contains no pesticides, herbicides, extractable organic compounds, and less than 5 $\mu g/\ell$ of purgeable organic compounds as measured by a low-level GC/MS scan.

Source: U.S. Environmental Protection Agency, Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM), U.S. EPA Region IV, Environmental Services Division, Atlanta, GA, February 1, 1991.

EPA Region V:

Typical Procedure: Region V has no published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

For all analyses except metals only:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Hydrochloric or nitric acid* rinse;
- Deionized water rinse;
- Pesticide grade methanol or isopropanol rinse;
- Organic-free water rinse; and
- Air dry.

* The acid rinse may be omitted if metals are not analyzed.

For metals only analyses:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Hydrochloric or nitric acid rinse;
- Reagent water rinse; and
- Air dry.

Source: TechLaw experience in EPA Region V, and approved Region V RFI Work Plans.

EPA Region VI:

Standard Operating Procedure:

For organics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Distilled water rinse;
- Pesticide-grade hexane or methanol solvent* rinse; and
- Air dry.

* EPA Region VI prefers that solvents not be used for equipment decontamination. Although this step is usually omitted, it may be required at the discretion of the EPA WAM.

For inorganics:

- Phosphate-free laboratory detergent wash;
- Dilute hydrochloric or nitric acid* rinse;
- Tap water rinse;
- Type II reagent grade water rinse; and
- Air dry.

* EPA Region VI prefers that acid rinses not be used during equipment decontamination. Although this step is usually omitted, it may be required at the discretion of the EPA WAM.

Source: U.S. Environmental Protection Agency, RCRA Sampling Procedures Handbook, U.S. EPA Region VI Office of Waste Programs and Enforcement, April 1991.

EPA Region VII:

Preferred Procedure: Region VII has no known published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

For organics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Pesticide-grade hexane or methanol* rinse;
- Reagent-grade acetone* rinse;
- Organic-free reagent water rinse; and
- Air dry.

* Isopropanol may be substituted as the solvent if hexane, methanol, or acetone are constituents of interest.

For inorganics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Dilute hydrochloric or nitric acid rinse;
- Reagent water rinse; and
- Air dry.

Source: U.S. Environmental Protection Agency, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001, November, 1992.

EPA Region VIII:

Preferred Procedure: Region VIII has no known published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

For organics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Pesticide-grade hexane or methanol* rinse;
- Reagent-grade acetone* rinse;
- Organic-free reagent water rinse; and
- Air dry.

* Isopropanol may be substituted as the solvent if hexane, methanol, or acetone are constituents of interest.

For inorganics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Dilute hydrochloric or nitric acid rinse;
- Reagent water rinse; and
- Air dry.

Source: U.S. Environmental Protection Agency, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001, November, 1992.

EPA Region IX:

Standard Operating Procedure:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Dilute nitric acid rinse*;
- Deionized/distilled water rinse;
- Pesticide-grade solvent** rinse;
- Double rinse with deionized/distilled water;
- Organic-free water rinse (HPLC grade).

* Nitric acid may, or may not be required per the discretion of the EPA WAM.

** Acetone is not recommended if it is a constituent of concern.

Source: U.S. Environmental Protection Agency, Preparation of a U.S. EPA Region 9 Sample Plan, November 1987.

EPA Region X:

Preferred Procedure: Region X has no known published standard operating procedure. If Level IV DQO decontamination is required, the following procedure may be followed.

For organics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Pesticide-grade hexane or methanol* rinse;
- Reagent-grade acetone* rinse;
- Organic-free reagent water rinse; and
- Air dry.

* Isopropanol may be substituted as the solvent if hexane, methanol, or acetone are constituents of interest.

For inorganics:

- Phosphate-free laboratory detergent wash;
- Tap water rinse;
- Dilute hydrochloric or nitric acid rinse;
- Reagent water rinse; and
- Air dry.

Source: U.S. Environmental Protection Agency, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001, November, 1992.

Health and Safety

Some of the materials used to implement the cleaning procedures outlined in this SOP can be dangerous if improperly handled. Due caution must be exercised by all personnel and all applicable safety procedures shall be followed. At a minimum, the following precautions shall be taken during cleaning operations:

- Safety glasses with splash shields or goggles and chemical resistant gloves are to be worn during all cleaning operations;
- All solvent rinsing operations are to be conducted under a fume hood or in the open (never in a closed room); and
- No eating, smoking, drinking, chewing, or any hand-to-mouth contact is permitted during cleaning operations.

It is TechLaw's policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with OSHA and other applicable and appropriate established standards and requirements.

All field personnel will be provided with appropriate personal protective clothing and safety equipment. At a minimum, this will include a hardhat, hearing protection, full-face respirator, steel-toed safety shoes, and safety glasses. Personnel are required to inspect their PPE prior to entering any job site and replace any damaged items.

A site-specific health and safety checklist/plan must be developed by the field team leader or designee and approved by the HSD prior to implementation in the field. This checklist/plan must be reviewed with the TechLaw field team members prior to beginning work.

Any deviation(s) from an approved site-specific health and safety checklist/plan must be documented in the field logbook.

QA/QC

The effectiveness of the equipment cleaning procedure used shall be monitored by rinsing cleaned equipment (equipment used to collect samples) with organic-free or DI water and submitting the rinse water for low-level analysis of extractable organic compounds including pesticides and a standard ICP scan for metals. At least one such sample shall be collected from

each piece of equipment used. Depending upon the procedures in the SAP, more samples may be taken. All such samples may not be analyzed, but should be available in case contamination is suspected. Normally the QC samples analyzed will not exceed 5 to 10 percent of the total samples taken.

Samples of all rinse materials shall be taken in the field. Any time a new source of cleaning materials or rinse water is used, a sample of that cleaning material or rinse water shall also be taken.

Comments/Notes

None at this time.

Attachments

Attachment A - Decontamination Area Layout

References

TechLaw Inc., Health and Safety Program, 1999.

TechLaw Inc., Quality Assurance Program Plan (as amended for the RCRA Enforcement, Permitting and Assistance Contract).

New York State Department of Environmental Conservation, Division of Hazardous Substances Regulation, RCRA Quality Assurance Project Plan Guidance, Appendix E, 1991.

U.S. Environmental Protection Agency, Region II CERCLA Quality Assurance Manual, U.S. EPA Region II Environmental Services Division, Revision No. 1, October 1989.

U.S. Environmental Protection Agency, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, Washington, D.C., 1987.

U.S. Environmental Protection Agency, Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM), U.S. EPA Region IV, Environmental Services Division, Atlanta, GA, February 1, 1991.

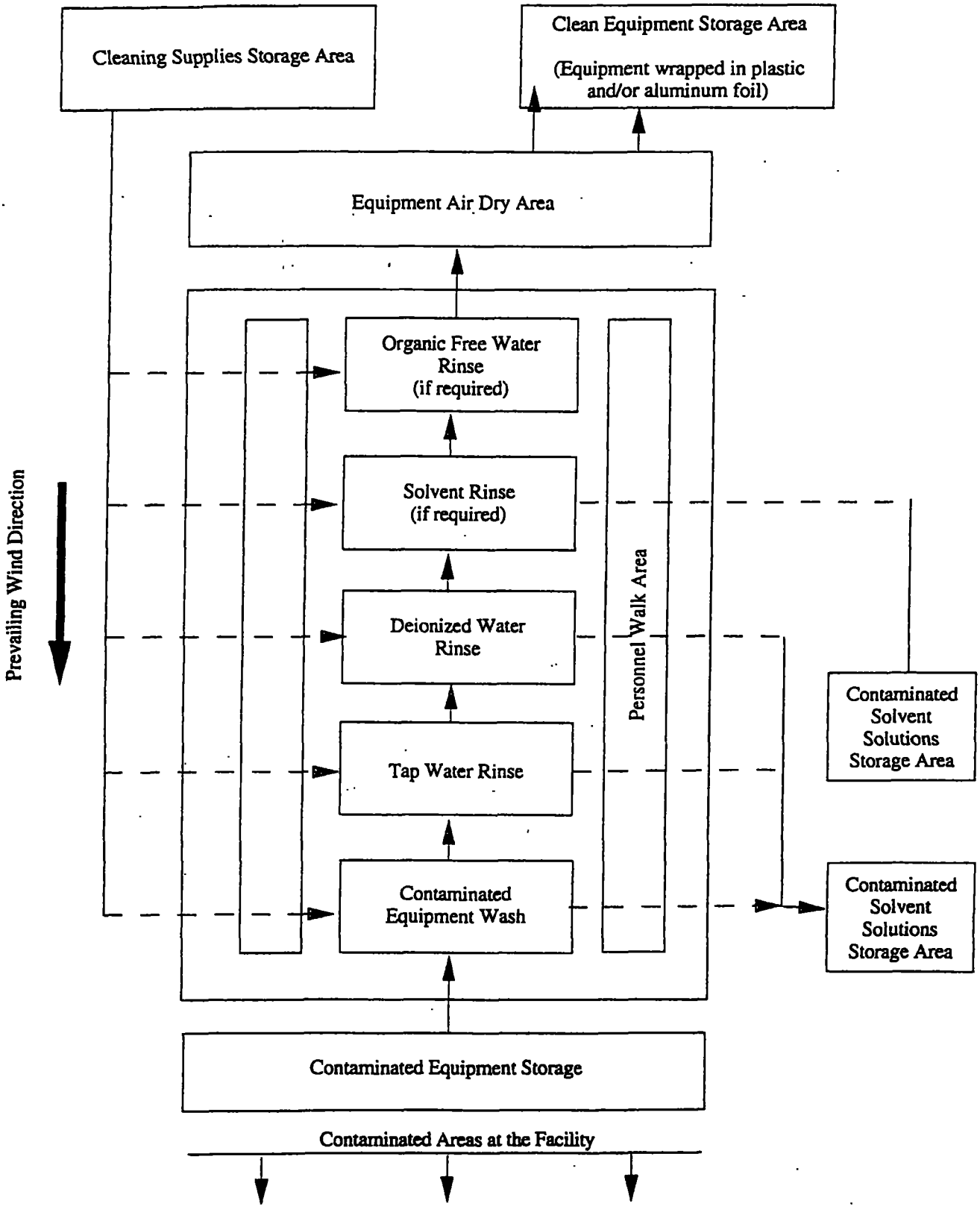
U.S. Environmental Protection Agency, Preparation of a U.S. EPA Region 9 Sample Plan, November 1987.

U.S. Environmental Protection Agency, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001, November, 1992.

U.S. Environmental Protection Agency, RCRA Sampling Procedures Handbook, U.S. EPA Region VI Office of Waste Programs and Enforcement, April 1991.

Attachment A
SOP Number: 02-03-01

Decontamination area layout



FIELD PROCEDURES - CHAIN-OF-CUSTODY

SOP Number: 02-05-01
Effective Date: 03/02/99

Technical Approval: David M. Walker Date: 8/19/99

QA Management Approval: John W Goode Date: 8/26/99

SOP Description

This Standard Operating Procedure (SOP) describes the steps that are to be taken to ensure a correct Chain-Of-Custody (COC) program is followed for every Techlaw project involving sampling activities. The program allows for the tracking of possession and handling of individual samples from the time of field collection through laboratory analysis. Because samples collected during an investigation could be used as evidence in litigation, possession of the samples must be traceable from the time each is collected until analytical results are introduced as evidence in legal proceedings.

This SOP must be used in conjunction with the procedures for packaging and shipping samples as discussed in SOP No. 04-03-XX, Environmental Samples, and SOP No. 04-04-XX, Waste Samples (Dangerous Goods).

General Procedures

Related SOPs

This SOP is to be used in conjunction with the other relevant or applicable SOPs found in the following SOP categories:

Section No.	Section Title
01	General Procedures
02	Field Procedures
03	Field Documentation Procedures
04	Packaging and Shipping Procedures
05	Field Equipment Operation and Maintenance Procedures
06	Groundwater Sampling/Monitoring and Analysis Procedures
07	Soil/Sediment Sampling and Analysis Procedures
08	Surface Water Sampling and Analysis Procedures
09	Health and Safety Procedures

10	Regulatory Compliance Procedures
11	Quality Assurance Procedures
12	Incineration/BIF Sampling and Analysis Procedures
13	Waste Sampling and Analysis Procedures

Equipment and Apparatus

- Sample identification labels
- Sample tags (with strings attached)
- Custody seals
- Chain-Of-Custody Records
- Receipt For Samples forms
- Ice chests and ice for sample shipment
- Nylon-reinforced strapping tape
- Clear (packing/strapping) tape
- Plastic zip-lock storage bags
- Pens with permanent water-proof ink

Definitions

Sample under Custody

A sample is considered to be under custody if one or more of the following criteria are met:

- The sample is in the sampler's or the transferee's actual possession,
- The sample is in the sampler's or transferee's view after being in his/her possession,

- The sample was in the sampler's or transferee's possession and then was locked up in a secure place to prevent tampering, and
- The sample is placed in a designated secure area.

Sampler

The sampler is defined as the person responsible for the collection of the samples. Any person on the sampling team may serve as the sampler.

Transferee

The transferee is the person designated to receive and maintain custody of the samples and coordinate shipment of the samples from the site of collection to the analytical laboratory. Any person on the sampling team may serve as the transferee. In addition, the role of the transferee may be filled by several different people throughout the course of the sampling activities. The basic function of the transferee is to assume the responsibility of custody of the samples from the time the samples are collected until they are relinquished to the shipping company or the analytical laboratory.

Description of Chain-Of-Custody Forms

The COC process requires that specific COC forms and paperwork be prepared to document custody of the samples from the time they are collected in the field until received by the analytical laboratory. A brief description of each of the forms and/or paperwork follows:

- **Sample Identification Label** - A sample identification label is affixed to each sample container to prevent misidentification of the samples after collection. The labels are usually self-adhesive and are affixed to the sample containers by placing them directly on the container exterior. Information to be provided on each label includes the site name, date, time, preservative used (if any), type of analysis to be performed, name of sampler, and sample control number. The information should be recorded using permanent water-proof ink. The sample labels can be affixed to the sample containers either immediately before or after the sample collection activities. However, care must be taken to ensure that the containers are not mislabeled if the labels are applied after the samples are collected.

Sample identification labels are usually provided along with the shipment of sample containers, however, they can also be purchased separately. Sample containers and labels may be acquired from either the laboratory contracted to perform the analytical work, or from an independent source (e.g., I-Chem or Eagle Picher). Examples of sample identification labels are provided in Attachment A.

- **Sample Tag** - A sample tag may also be used to identify samples collected in the field. Although only one identification method is required (i.e., sample identification label or sample tag), it is recommended that both be used (if practical) because the sample could be identified from the sample tag if the ink on the sample label were to smear from water contact or if the sample container were to break during shipment. A sample tag consists of a tyvek identification label which is tied to the neck of the sample container. Information to be provided on each sample tag includes the project code, sample station number, the date and time of sample collection, type of sample (i.e., grab or composite), sample station location, the samplers' signatures, whether or not a preservative was added, type of analysis to be performed, tag number, and lab sample number. A copy of a sample tag is provided in Attachment B.

- **Custody Seal** - A custody seal is affixed over each sample container and lid to provide evidence that the sample was not tampered with during transport to the analytical laboratory. The custody seals are self-adhesive and should be placed such that they cover the sample containers and lids and sample tag strings, but not the writing on the sample labels. At a minimum, the custody seals must contain the date and signature of the sampler; however, some seals also provide space to include the sample number, the name of the individual who breaks the seal, and the date that the seal is broken. Care must be taken to ensure that all sample identification characters are transcribed correctly on all related documents. Custody seals are also used to secure the sample shipping containers and lids. Examples of custody seals are provided in Attachment C.

- **Chain-Of-Custody Record** - A COC Record is used to track and document sample possession from the time of collection until receipt at the analytical laboratory. A completed form must be filled out to accompany each shipment of samples to the laboratory. Information to be recorded on the form may include the project number, project name; name and address of analytical laboratory; samplers' names and signatures; date and time of sample collection; sample identification numbers; sample description; type of preservative; grab or composite; number of containers included in the shipment; analytical parameters requested; and sample tag number. The bottom portion of the form contains blocks for the signatures of the persons involved in the chain of

possession, inclusive dates of possession, and any pertinent remarks. A copy of a COC Record form is provided in Attachment D.

- **Receipt For Samples Form** - RCRA Section 3007 and CERCLA Section 104 require that a "receipt" for all facility samples collected during inspections and investigations be given to the owner/operator of each facility before the field investigator departs the premises. A Receipt For Samples form may be used to satisfy these requirements. In addition, the form may also be used to document that split samples were offered to, and were accepted or rejected by, the owner/operator of the facility, as well as documenting this in the field logbook. A COC Record may also be used to document the collection of split samples. Information to be entered on the form includes the project number and name; facility name and location; samplers' signatures; sample station number and description; date and time of sample collection; type of samples collected (e.g., groundwater or soil; grab or composite); sample tag numbers; number of containers; any pertinent remarks; and the signatures of the persons involved in the chain of possession. A copy of a Receipt for Samples form is included as Attachment E.

Chain-Of-Custody Procedures

The field sampling team is responsible for the care and custody of all field samples from the time of collection until shipment to the analytical laboratory. The specific COC procedures to be followed for each sampling event are listed below.

- The sampling team should collect samples in the field such that the most sensitive parameters are addressed before the less sensitive parameters (e.g., volatile organic samples should be collected prior to metals, cyanide, and other parameters). Refer to the SOP "06-," "07-," and "08-," "12-", and "13-" series for specific sampling procedures for groundwater, soil/sediment, surface water, incineration/BIF, and waste respectively.

- Each sample container should be filled with the sample, and then placed in an ice chest which contains either bagged ice or "blue ice."[1] All environmental sample containers must be placed in the ice chest immediately after collection to preserve the integrity of the

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[1] Only environmental samples should be preserved with ice; waste samples are never shipped with ice. Refer to SOP No. 04-03-XX for more information regarding the packaging and shipping procedures for environmental samples.

sample parameters. [2] The ice chest with the samples must remain in view of the samplers in order for the samples to remain in custody.

- After all sample parameters have been collected at a specific sample location, the sampling team travels back to the central staging area, relinquishes control of the samples to the transferee for safekeeping, and prepares for the next sampling location.

- Upon receiving the samples from the sampling team, the transferee removes the samples from the field ice chest and places them in a sample storage ice chest located at the central staging area. This ice chest must remain under the control of the transferee at all times.

- The transferee (or other field team members as appropriate) should inspect the sample containers to ensure they were properly filled and secured. Any problems observed with the sample containers (e.g., broken glass containers, sample bottles not adequately filled, loose lids) should be completely documented in the field logbook.

- If not already affixed, the transferee/field team members should apply sample identification labels and/or sample tags to the sample containers. A layer of clear (packing/strapping) tape may be placed directly over each sample label to prevent the ink from smearing and slippage of the label due to condensation on the outside of the container. After the sample containers have been labeled/tagged, the transferee secures each sample with custody seals and places them into plastic zip-lock bags. Large sample containers (e.g., one-gallon amber glass jugs) do not need to be placed into plastic bags. The sample containers are then returned to the sample storage ice chest.

- After all samples have been collected and the containers appropriately labeled, the transferee then completes the COC Record. The transferee and/or sampling team members transfer the sample containers from the sample storage ice chest into the sample shipping container (which may be a different ice chest). The transferee/team members

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[2] During sample collection activities, it is recommended that the sample containers from only one sample location be stored in the field ice chest at any one time. This procedure reduces the potential for cross-contamination between samples, which is more likely to occur when several samples are stored in the ice chest simultaneously. Samples should be commingled in the field ice chest only when the sampling locations are separated by great distances and the collection times would be substantially increased.

must ensure that the samples are properly packaged within the shipping container. Refer to SOP No. 04-03-XX for sample packaging and shipping procedures.

- The original and one copy of the COC Record must be placed inside a plastic zip-lock storage bag and taped to the underside (interior) of the shipping container lid. One copy of the COC Record must be retained by the transferee for placement into the engagement/project files. Either pre-printed multiple copy forms or carbon paper may be used to make the required copies.

- The sample shipping container should then be closed and secured it with several layers of nylon reinforced strapping tape at each end of the shipping container. At least two custody seals must be placed along the front and back edges of the container, where the container body and lid meet. The custody seals should be affixed such that the shipping container cannot be opened without tearing or disturbing the seals. Secure the seals by covering them with tape. The seals should be secured to prevent their accidental removal during shipment. Only one layer of tape should cover the seals to ensure that they remain visible through the tape.

- The shipping airbill should then be completed and attached to the shipping container. The transferee (or other sample team member as designated by the transferee) must personally deliver and release the shipping container to the shipping company or the analytical laboratory.

- If it is not possible to release the sample shipment to the shipping company, or if the samples must be retained overnight, the transferee or designated custodian must maintain custody of the samples until the shipment can be accomplished. Custody is maintained provided the samples:

  - Remain in the transferee's actual possession,
  - Remain in the transferee's view after being in his/her possession,
  - Are locked up in a secure place to prevent tampering, and
  - Are placed in a designated secure area.

  Samples retained overnight must remain in the control of the transferee or designated custodian to the greatest extent possible (e.g., the samples must be stored in the transferee's hotel room instead of the trunk of a car). If the shipping delay is of a short duration, the shipping container should remain closed and sealed. The actual release time to the shipping company should then be entered in the field logbook. If the delay time is

of a longer duration, the shipping container should be re-opened and additional ice added to the container. In addition, the laboratory should be contacted and informed of any pending shipping delays.

- Prepare a Receipt For Samples form or a COC form and present it to the facility representative prior to departing the facility. Document in the field logbook whether split samples were offered to, and were accepted or rejected by, the facility representative. The transferee must keep one copy of the Receipt For Samples form or COC form for inclusion in the engagement/project files.

- Document all field sampling and shipping activities, and COC procedures in the field logbook and photographic record. In addition, any COC deviations from the SAP or this SOP must be documented and justified in the field logbook. Field logbook and photographic log documentation procedures can be found in SOP Nos. 03-01-XX and 03-02-XX, respectively.

Health and Safety Section

It is TechLaw's policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with OSHA and other applicable and appropriate established standards and requirements.

All field personnel will be provided with appropriate personal protective clothing and safety equipment. At a minimum, this will include a hardhat, hearing protection, full-face respirator, steel-toed safety shoes, and safety glasses. Personnel are required to inspect their PPE prior to entering any job site and replace any damaged items.

A site-specific health and safety checklist/plan must be developed by the field team leader or designee and approved by the TechLaw Health and Safety Director prior to implementation in the field. This checklist/plan must be reviewed with the EH&S field team members prior to beginning work.

Any deviation(s) from an approved site-specific health and safety checklist/plan must be documented in the field logbook.

QA/QC Section

None at this time.

Comments/Notes

None at this time.

Attachments

Attachment A - Sample Identification Labels (examples)

Attachment B - Sample Tag

Attachment C - Custody Seals (examples)

Attachment D - Chain-Of-Custody Record

Attachment E - Receipt For Samples Form

References

TechLaw Inc., Health and Safety Program, 1999.

TechLaw Inc., Quality Assurance Program Plan (as amended for the RCRA Enforcement, Permitting, and Assistance Contract).

US EPA Office of Research and Development, Characterization of Hazardous Waste Sites - A Methods Manual: Volume I - Site Investigations, EPA/600/4-84/075, April 1985.

US EPA Office of Research and Development, Characterization of Hazardous Waste Sites - A Methods Manual: Volume II - Available Sampling Methods, Second Edition, EPA-600/4-84-076, December 1984.

US EPA Office of Emergency and Remedial Response, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, NTIS Report Number PB88-181557, December 1987.

US EPA Region IV Environmental Services Division, Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM), February 1, 1991.

US EPA Office of Solid Waste, RCRA Ground-Water Monitoring: Draft Technical Guidance, EPA/530-R-93-001; NTIS Report No. PB93-139350, November 1992.

US EPA Office of Solid Waste and Emergency Response, RCRA Ground-Water Monitoring Technical Enforcement Guidance Document (TEGD), OSWER-9950.1, September 1986.

Attachment A
SOP Number: 02-05-01

EAGLE PICHER
ENVIRONMENTAL SERVICES
36 B. J. TUNNELL BLVD. · MIAMI, OK 74354
1-800-331-7425

Specially Cleaned
Sample Container

LOT NO.:

DATE: | TIME: | COLLECTED BY:

SAMPLING SITE:

SAMPLE TYPE:
☐ Grab ☐ Composite ☐ Other _____

TESTS REQUIRED: | PRESERVATIVE

Client _____

Project _____

Location _____

Station _____

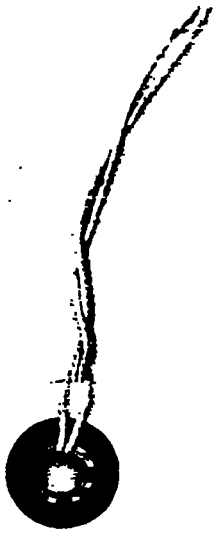
Collected by _____

Date _____ Time _____

Preservative(s) A PEST

EA 0447 3/22/89

Attachment B
SOP Number: 02-05-01



Designate: Grab / Comp.	Samplers (Signatures)	Preservative: _____ Yes ☐ No ☐		
		Volatile Organics (VOA)		
		Semi Volatiles (ABN)		
		Pesticides/PCB		
		_____Metals		
		Cyanide		
Time		Alkalinity/Hardness		
		TCLP		
		☐ VOA		
		☐ ABN		
Month/Day/Year		☐ METALS		
	Station Location	Asbestos		
		Dioxin		
		Oil and Grease		
Station No.				
		Remarks:		
Project Code CLP Case No.		Concentration: ☐ L ☐ M ☐ H		
	Tag Number 6-215951		Lab Sample No.	

☆ U.S.GPO:1998—761-827

Attachment C
SOP Number: 02-05-01

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
OFFICIAL SAMPLE SEAL

SAMPLE NO. | DATE

SIGNATURE

PRINT NAME AND TITLE *(Inspector, Analyst or Technician)*

SEAL BROKEN BY | DATE

EPA FORM 7600-2 (R7-78)

CUSTODY SEAL
Date
Signature

CUSTODY SEAL
Date
Signature

CUSTODY SEAL

DATE _____

SIGNATURE _____

CHEM
(800) 443-1689
(800) 553-3696
Specialty Cleaned Containers

(FORM HAS BEEN REDUCED FOR SOP)

TechLaw

Chain of Custody Record

TechLaw Inc.,

Project Code	Samples Shipped To	Samplers Names	1) Sample description (Enter in column A) 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil/Sediment 6. Oil 7. Waste 8. Other (specify)	2) Preservatives (Enter in column B) 1. HCl 2. HNO_3 3. Na HSO_4 4. H_2SO_4 5. Na OH 6. Other (specify) 7. Ice only N. Not preserved
Project (site) Name				
City, State, Zip Code	Carrier	Samplers Signatures		
Date Shipped	Air Bill Number			

Sample Identification Numbers	A. Matrix enter from Box 1	B. Preser. enter from Box 2	Grab or Comp	Number of Sample Containers	MM/DD/YY Time sample collection	Analysis												Remarks/ Tag Numbers

Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date
Relinquished By	Time	Date	Received By	Time	Date	Received By	Time	Date	Received By	Time	Date

Remarks

Distribution: Original — TechLaw Inc.,
Carbon copies — Laboratory, work assignment manager, client (as appropriate)

Page ___ of ___

(FORM HAS BEEN REDUCED FOR SOP)

TechLaw

Receipt For Samples

TechLaw Inc.,

Proj No	Project Name	Name of Facility/Site
Samplers: *(Signature)*		Facility/Site Location
Split Samples Offered ( ) Accepted ( ) Declined		

Station No.	Date	Time	Comp	Grab	Split Samples	Tag Numbers	Station Description	No. of Containers	Remarks

Transferred by: *(Signature)*	Telephone	Received by: *(Signature)*	Telephone	
Date	Time	Title	Date	Time

FIELD DOCUMENTATION PROCEDURES - MAINTAINING A FIELD LOGBOOK

SOP Number: 03-01-02
Effective Date: 02/01/99

Technical Approval: David M. Walker Date: 3/30/99

QA Management Approval: John W. Houck Date: 4/5/99

SOP Description

This Standard Operating Procedure (SOP) establishes general practices and requirements for the use of field logbooks during environmental field activities, including but not limited to soil/sediment sampling, groundwater sampling, well installations, surface water sampling, environmental assessments, and environmental audits. SOPs for the use of field logbooks during RCRA Visual Site Inspections and oversight of RCRA Facility Investigations and Remedial Investigations are provided in SOP Nos. 03-03-XX and 03-04-XX, respectively.

Field logbooks are used by personnel to document all activities and information gathered in the field. The field logbook entries must be legible, factual, detailed and objective. Proper field documentation is crucial in the logbook because the logbook ultimately may become part of the public record and may be used in future legal actions. The field logbook must provide sufficient documentation to enable participants to reconstruct events that occurred and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings.

General Procedures

Related SOPs

This SOP is to be used in conjunction with other relevant or applicable SOPs found in the following SOP categories:

Section No.	Section Title
01	General Procedures
02	Field Procedures
03	Field Documentation Procedures
04	Packaging and Shipping Procedures
05	Field Equipment Operation and Maintenance Procedures
06	Groundwater Sampling/Monitoring and Analysis Procedures

07	Soil/Sediment Sampling and Analysis Procedures
08	Surface Water Sampling and Analysis Procedures
09	Health and Safety Procedures
11	Quality Assurance Procedures
12	Incineration/BIF Sampling and Analysis Procedures
13	Waste Sampling and Analysis Procedures

Equipment and Apparatus

- Field logbooks (Minimally one per person.)
- Black or Blue pens with waterproof ink (preferably)
- Compass
- Watch
- Thermometer

Type of Field Logbook

The field logbook must be bound and preferably waterproof. A standard surveyor's notebook or the "Rite in the Rain"® Weatherproof Transit Book No. 300, J.L. Darling Corporation, Tacoma, Washington, are acceptable notebooks which can be used by TechLaw personnel. Other notebooks are acceptable, provided that they are bound prior to use in the field. A supply of field notebooks is kept in each office location.

Maintenance of Field Logbook

The field team leader is responsible for the field logbooks. Each field team member may be required to maintain a field logbook; in addition, the field team leader may designate a team member as the official record keeper. To assure consistency in documentation, each logbook is to be maintained by the same person for the duration of the project, if feasible. The field team leader must review the logbooks during the environmental field activities to check that the procedures in this SOP are being followed and that the information is entered correctly. Additionally, it is the responsibility of the field team leader to ensure that RCRA CBI procedures are followed if confidentiality is requested by the facility representative.

Notations in Field Logbook

- All notations in field logbooks should be made in waterproof ink. A standard ball-point pen is acceptable. No erasures may be attempted. Any corrections or deletions are to be made by drawing a single line through the unwanted notation, so that the notation is still legible. The writer then places his/her initials and the date near the deletion. Under no circumstances are pages to be removed from a field logbook.

- All field logbook notations must be legible.

- A separate field logbook must be used for each project. More than one logbook may be used for a single project if the complexity of the site requires that two separate field teams are active on different parts of the facility simultaneously. If more than one logbook is used, each is to be numbered sequentially (e.g., 1 of 3, 2 of 3, 3 of 3). If two or more separate field teams are maintaining logbooks, each team's logbooks are to be numbered sequentially and clearly identifiable (e.g., TeamA Book1 of 2, TeamA Book 2 of 2, TeamB Book2 of 2). Each page of the field logbook must be numbered in the upper right-hand corner. Each page also must be dated and signed by the writer. For pages only partially filled with text, a diagonal line must be drawn from the end of the text to the bottom of the page. When field activities last more than one day, the next day's documentation begins on the next page of the field logbook. Relevant site information (e.g., weather, site personnel [personnel could change during the course of the field work], strategies) must be listed at the beginning of each day's activities. Also, more than one team member may maintain a logbook at the discretion of the team leader. The maintenance of a logbook is discussed in more detail in the appropriate Field Documentation SOP (e.g., VSI, Corrective Action Oversight).

- The individual maintaining the logbook must put his/her name, associated office, and address on the inside cover or the first (title) page of the logbook. The first page must include the title of the project, project number, facility name, facility location, EPA Identification Number (if appropriate), date(s) of activity, names and companies of the team members and any other appropriate identifying information. If more than one field logbook is used at a facility, each must contain the required project information on the inside cover or the first (title) page of the logbook.

- Information is generally listed in chronological order in the field logbook and by the time of day. All times are to be entered in a 24-hour format (e.g., 7:00 p.m. is 1900). All factual information obtained during field activities must be recorded in the logbook. Information that is not in or referred to in the logbook may not be used in deliverables associated with the field work. The field logbook contains only factual information--no conclusions are placed in the logbook. Weather conditions are documented at least twice a day and must be noted immediately with any significant weather change (e.g., thunderstorm).

  Often, sketches are preferred to written descriptions (or used in conjunction with), especially where photographs will not be taken. Sketches must include a north arrow, a rough scale and position of buildings, and any other notable features, such as landmarks (trees, streets etc.).

  When photographs are taken, the photograph number (i.e., roll number and film number) is entered into the logbook as well as time of day, compass direction, and a description of what was photographed. Document relevant features such as cracks and staining. See SOP No. 03-02-XX, Taking and Documenting Photographs, for further details.

- The field logbook is the property of the client[1]. The project manager is the custodian of the field logbook for the duration of the project. It must remain in the custody of the project manager (or a designated person) until the conclusion of the project. The field logbook is then turned over to the official project file.

Health and Safety

It is TechLaw's policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with OSHA and other applicable and appropriate established standards and requirements.

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[1] Work products such as field logbooks that are generated during the performance of government contracts are considered the property of the government client. See SOP No. 11-07-XX for further details regarding document control requirements.

All field personnel will be provided with appropriate protective clothing and safety equipment. At a minimum, this will include steel-toed shoes, safety glasses, and chemical-resistant gloves.

A site-specific health and safety checklist/plan must be developed by the Field Team Leader or designee and approved by the TechLaw Health and Safety Director prior to implementation in the field. This checklist/plan must be reviewed prior to beginning work.

Any deviation(s) from an approved site-specific health and safety checklist/plan must be documented in the field logbook.

QA/QC

The Field Team Leader or designee is to conduct periodic QC reviews during a site visit to ensure documentation procedures and administrative requirements have been met.

Comments/Notes

None at this time.

Attachments

None at this time.

References

TechLaw Security Plan for the Control and Security of RCRA Confidential Business Information, August 8, 1994.

TechLaw, Inc., Health and Safety Project Plan, 1999.

U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14, Washington, D.C., December 1987.

U.S. Environmental Protection Agency, Office of Solid Waste, RCRA Facility Assessment Guidance, October 1986.

FIELD DOCUMENTATION PROCEDURES - TAKING AND DOCUMENTING PHOTOGRAPHS

SOP Number: 03-02-02
Effective Date: 03/25/99

Technical Approval: Dave D M. Walker Date: 3/29/99

QA Management Approval: John W Goode Date: 4/5/99

SOP Description

This Standard Operating Procedure (SOP) establishes the practice and requirements for documenting and taking photographs during field activities including RCRA Visual Site Inspections (VSIs), oversight of RCRA Facility Investigations (RFIs), oversight of Remedial Investigation/Feasibility Studies (RI/FSs), compliance enforcement inspections (CEIs), comprehensive groundwater monitoring evaluations (CMEs), conduct of sampling activities, and property transfers.

The purposes of these activities are to gather sufficient information and documentation to relay observations to the client and to provide the basis for suggestions for further action or recommendations.

Photographs are taken to obtain visual information concerning unit characteristics, waste characteristics, pollutant migration pathways, releases, and exposure potential. Critical documentation is important because these photographs may eventually be used in enforcement/defense cases, legal actions (as evidence of past releases), or as a basis for property transactions. The photographs could be used months or even years later and must be thoroughly documented.

This SOP indicates the types of information that must be recorded in the field logbook in conjunction with the types of things that must be photographed. The photograph log serves as a visual record of what was seen during the field activities.

General Procedures

Related SOPs

This SOP is to be used in conjunction with other relevant or applicable SOPs found in the following SOP categories:

Section No.	Section Title
01	General Procedures
02	Field Procedures
03	Field Documentation Procedures
04	Packaging and Shipping Procedures
06	Groundwater Sampling/Monitoring and Analysis Procedures
07	Soil/Sediment Sampling and Analysis Procedures
08	Surface Water Sampling and Analysis Procedures
09	Health and Safety Procedures
11	Quality Assurance Procedures
12	Incineration/BIF Sampling and Analysis Procedures
13	Waste Sampling and Analysis Procedures

Equipment and Apparatus

- 35 mm camera and operating instructions (If it is a large facility, two cameras may be necessary.)
- Extra batteries
- 200 ASA speed film, 24 exposures (minimum)
- Compass
- Watch
- Ruler/pen/coin (to illustrate scale)

Permission to Take Photographs

When conducting field activities under government contracts (e.g., REPA), obtain permission to take photographs from the facility representative prior to the field activities. If there is an appearance of resistance from the facility representative, inform the client (e.g., EPA) and together develop a course of action/strategy to obtain resolution prior to the field activities. In addition, it is the responsibility of the field team leader to ensure that RCRA CBI procedures are followed if confidentiality is requested by the facility representative.

Maintenance of the Camera

The following generic operating and maintenance activities must be performed in accordance with specific directions provided with the camera.

- Routine inspection and cleaning are to be conducted prior to the field activities. If unfamiliar with the type of camera, review the general directions provided by the manufacturer. However, prior to field activities, ensure familiarity with such "how to" procedures as:

  - Insert and check the battery,
  - Load and rewind the film,
  - Set the film speed, and
  - Set the clock.

- Routine testing of batteries must be conducted prior to the field activities and at the beginning of each day in the field. Additional spare camera batteries should be on hand.

- Remedial action in the event of failure or malfunction must be in accordance with the camera warranty (if applicable) and directions for troubleshooting. A malfunction can be caused by shock, humidity, salt, etc. If a camera has been used in the presence of chemicals, it is to be wiped clean. Also, the camera must not be placed near strong magnetic fields (e.g., televisions).

General Information Regarding Cameras and Film

Camera Types

Each TechLaw field ready office location should have a 35 mm automatic-focusing/automatic-winding camera or access to one. See SOP No. 02-02-XX for details regarding equipment requisition and return if more than one camera is needed. These cameras are relatively simple to use since they do not require manual focusing or shutter speed adjusting. This is advantageous since the photographer may also be tasked with recording the photo description and negative number as well as asking questions regarding the purpose of the unit being photographed. These cameras should have an internal clock which records the date and/or time the photograph was

taken. Setting the clock is important because it provides additional documentation and also helps in organizing the photographs. The date is a priority. If you can include both settings (i.e., date and time), this is preferred. Telephoto lenses are not to be used as they can distort the scale of an image.

Types and Quantities of Film Needed

The recommended film is Kodak Gold® film, 200 ASA speed for 24 exposures (minimum). A sufficient number of rolls of film must be taken on field activities. Since the film rolls are small, a good rule of thumb is to take two rolls for every 10 units or SWMUs identified prior to the field activities. Alternatively, take two rolls for every 25 acres of the site. For sampling visits, one roll for every 6 samples may be sufficient. This would allow for 4 pictures per sample location using a 24 exposure roll. Typical photos would include one overview, one closer view of the sample collection, one of the filled sample containers, and one extra for other documentation needs. Take as many rolls as you think you will need and then add two as a safety margin. The unused film must be returned to the office.

Treatment and Shipment of Camera and Film

Contrary to rumor, film generally is not affected by the X-ray machines at airport security check stations. However, the X-ray machine will have an effect if the film speed is 1000 ASA or if the film is repeatedly exposed to the X-rays (going through the X-ray machine more than four times).

There are no special shipment procedures for the camera or film. The camera and unexposed film can be packed and checked in the suitcase of the field personnel or shipped in an ice chest with other field equipment.

In order to prevent loss, the exposed film rolls must be carried onto the plane and kept in one's possession at all times. Do not check any exposed film with luggage.

Commonly, there will be unexposed photographs on the last roll of film in the camera. Automatic cameras typically do not allow for rewinding the film until all photographs are taken. One option is to open the shutter, place your hand over the lens and shoot the remaining photographs. These will appear as black negatives and usually there is no charge for processing these. Alternatively, photographs of

surrounding areas, such as waterways and residences, or overviews of the facility can be taken in order to complete the roll.

Types and Subjects of Photographs

- During field activities, the field team leader selects one team member to take photographs and record the appropriate information in the field logbook. Photographs must be taken of each unit or SWMU identified unless the facility representative denies permission for that particular unit. In these cases, the refusal is to be documented in the field logbook.

- Photographs are taken to document conditions at the facility or sampling activities. The types of pictures taken must include:

  - Representative overall pictures of the facility or site;
  - Posted signs identifying ownership of the facility or site;
  - Evidence of releases (e.g., leachate seeps, pools of liquid, discolored water, and stained soils);
  - Individual units such as lagoons, drums, and landfills;
  - Visual evidence of poor facility maintenance;
  - Examples of typical facility operation;
  - Adjacent land use;
  - Sample locations/activities; and
  - Areas that unauthorized persons can easily access.

- Information that must be recorded in the field logbook in conjunction with each photograph includes:

  - Photographer's name;
  - Type of camera and lens (e.g., 35mm) and camera identification number;
  - Type of film;
  - Photograph number;
  - Date and time;
  - Name and identification number of unit or SWMU;
  - Location of unit or SWMU;
  - Orientation of photograph (i.e., direction photographer is facing);
  - Observed evidence of release (e.g., staining, overflow);

- Notable features of unit or SWMU that may provide evidence of release (e.g., cracking, obvious lack of integrity of unit);
- Information to help characterize the unit, or picture; and
- Other comments (e.g., weather).

- When photographs are taken of objects that are small or close up, a ruler, pen or coin is to be included in the frame to illustrate the scale so one will be able to more easily explain or describe the dimensions or proportions.

- During sampling activities, photographs are to be taken of actual sample collections, conditions of sampling location (e.g., monitoring well head and pad, soil sampling location with respect to surroundings), filled sample containers, and the chain-of-custody seals on the closed and sealed ice chests.

- For engagements conducted for regulatory agencies or in the case of property transactions, permission to take photographs must be obtained from the owner/operator of the facility. Inform the owner/operator that you will point out or explain what you would like to photograph before you actually take the photographs.

  Listed below are three possible scenarios, in order of preference, by which photographs are taken and processed:

  - You take the photographs and leave with the roll(s) of film at the end of the field activities.
  - If permission for you to take the photographs is denied, negotiate with the owner/operator to have them take the photographs, but let you leave with the roll(s) of film.
  - The least desirable approach is when permission to take the photographs is denied, or the facility allows you to take the photographs but will not let you leave with the roll(s) of film. In these cases, negotiate with the owner/operator to have the photographs developed at a 1 hour process lab, review them, and provide the required number of copies and negatives to you. In these cases, the client (e.g., EPA) must be aware of these arrangements and approve them. Note: There have been instances where photographs were taken by the owner/operator, but were never provided to TechLaw.

Development/Handling of Photographs and Negatives

Commercial developing facilities may be utilized for the processing of the 35 mm film. A minimum of two 4x6 copies of each photograph must be requested - one for submittal to the client and the other for the TechLaw engagement/contract files. Prior to developing the film, determine how many copies of the photographs are needed through discussions with the client, or Project Manager. For example, some clients require two copies; therefore, in order to have a set for the TechLaw files, three copies must be made. On occasion, the facility will request a copy of the photographs. If the client is a regulatory agency (e.g., EPA), this must be approved by the regulator prior to providing the photographs to the facility. Under no circumstances must the negatives be sent to or left with the facility. Financial reimbursement must be agreed to prior to photographic duplication. At the end of the assignment, the negatives are forwarded to the Program Manager for inclusion in the engagement/contract files.

In instances where a facility requests that the photographs be treated as RCRA CBI (or some other form of confidentiality), the photographs and negatives must be designated, logged, handled, stored, and transmitted in the same manner as any other RCRA CBI material.

Photo Log

The purpose of a photo log is to present the photographs taken during field activities along with brief documentation describing them. Each write-up is to provide the name and number of the unit (e.g., Storage Tank 11, SWMU 3), a description of the unit or activity, and the compass direction. Note any particular background items that should be brought to the attention of the reader (e.g., note the absorbent materials on the floor around the drum). Notations should be limited to pertinent facts. The photo log format may vary depending upon the client's instructions. Three examples are provided in Attachment A.

In addition, maps and drawings (which contain a scale and compass points) can be appended to provide further clarification of the photographs and field logbook entries. Notations can be made on the maps showing where the photographs were taken and in what compass direction, as well as the number on the roll of film.

Health and Safety

It is TechLaw's policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with OSHA and other applicable and appropriate established standards and requirements.

All field personnel will be provided with appropriate protective clothing and safety equipment. At a minimum, this will include steel-toed shoes, safety glasses, and chemical-resistant gloves.

A site-specific health and safety checklist/plan must be developed by the Field Team Leader or designee and approved by the TechLaw Health and Safety Director prior to implementation in the field. This checklist/plan must be reviewed prior to beginning work.

Any deviation(s) from an approved site-specific health and safety checklist/plan must be documented in the field logbook.

QA/QC

None at this time.

Comments/Notes

Upon project completion, the logbook(s), one set of photographs and all negatives must be forwarded to the engagement/contract files.[1]

Attachments

Attachment A - Photograph Log Examples

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[1] Work products such as photographs and negatives that are generated during the performance of government contracts are considered the property of the client. See SOP No. 11-07-XX for further details regarding document control requirements.

References

TechLaw, Inc., Health and Safety Project Plan, 1999.

TechLaw, Security Plan for the Control and Security of RCRA Confidential Business Information, August 1994.

K.W. Brown, Ph.D.; "The whole truth and nothing but... The soil scientist as the expert witness;" Soils: Analysis, Monitoring, Remediation; September-October 1991.

U.S. Environmental Protection Agency, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, OSWER Directive 9355.0-14. Washington, D.C., 1987.

U.S. Environmental Protection Agency, Environmental Monitoring Systems Laboratory, Characterization of Hazardous Waste Sites - A Methods Manual, Volume 1 - Site Investigations, EPA/600/4-84/075, Las Vegas, NV.

U.S. Environmental Protection Agency, Office of Solid Waste, RCRA Facility Assessment Guidance, October 1986.

U.S. Environmental Protection Agency, Region IV, Environmental Service Division, Engineering Support Branch Standard Operating Policies and Procedures, Georgia, February 1991.

Attachment A - Photograph Log Examples

1. Overview of finished monitoring well LF-2, facing southwest. Note drums containing drill cuttings are in contact with the soil.

2. Facing northeast towards finished monitoring well LF-2. Note the well casing has not been grouted around the surface. The drums contain drill cuttings.

3. View (looking east) of the Torit Dust Collector. Note the 55-gallon drums which receive the particulates that are removed from the indoor air. This is a representative unit for the other cyclones in the plant.

4. Close-up view of the Former Oil/Water Separator No. 13. This unit is presently operating as a catch basin for oily wastewater prior to piping to the Building 29-N 40,000-Gallon Oily Wastewater Tank (SWMU A-5).

5. View (looking east) of the removal pipe for Tank W-82. The Waste Oil Vacuum Truck (SWMU L-46) collects the waste oil/jet fuel at this point. Note the staining on and poor condition of the asphalt. The stained building in the background is a test cell.

6. View of Underground Waste Storage Tanks W-89 and W-92 after being exhumed. The hole was cut in the side of the tank to examine the metal for value as scrap. This is not the original location of these tanks.

7. View of surface access area to Underground Waste Oil Storage Tank W-50. Note the oil-stained pavement and absorbent in the area.

8. View (looking north) of the manhole and bermed access area to underground Waste Storage Tank W-53. Note oil staining on berm and in containment area.

9. View of rinsing split spoon sampler, in foreground, with the drill rig in the background. Note the driller in the background is not wearing gloves.

10. Underground Discharge Pipe. Close-up of the asphalt road covering the underground discharge pipe. The location of the pipe is indicated by the parallel cracking. Note: In the background are the former lagoons. View is facing west.

Example No. 2:

TECHLAW, INC.

Contract No. XX-XX-XXXX

PHOTO #

SITE NAME\EPA ID # _____

SITE LOCATION _____

PHOTOGRAPHER/WITNESS _____

DATE _____ **TIME** _____ **DIRECTION** _____ **WA#** _____

COMMENTS _____

Example No. 3:
A third procedure for photograph logs is by using Avery Labels #5163. To setup the format for the labels in WordPerfect select format. Go down the screen to labels. A popup screen will appear. Scroll down to 5163 and then press the select button.

The completed photograph log labels are peeled and placed on the back of the appropriate photograph. The photographs are then placed into a clear plastic photograph storage sheet. An example of the photograph log labels format is on the following page.

Photo #T1-01 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1325

Tank 901A, labeled "Used Alkaline Storage".

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

Photo #T1-02 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1405

Tank 901A. Note: dark material in secondary container. Location for Sample SUI01.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SW

Photo #T1-03 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1410

Drum located next to Tank 901A (just north). Note: no label is observed on the drum. Sample SUI05 collected from this drum.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

Photo #T1-04 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1440

Photo of sample jar of sample SUI05. Note: The sample jar is an amber color and does not reflect the color of the material inside.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

Photo #T1-05 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1445

Photo of sample jar for sample SUI01. Note: The sample jar is an amber color and does not reflect the color of the material inside.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

Photo #T1-06 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1513

Photo of "Used Cyanide Storage" Tank 901B. This is the sample location of Samples SUI02 and SUI03.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SW

Photo #T1-07 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1515

Photo of Acid Tank. Sampling location for sample SUI04.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** NE

Photo #T1-08 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1540

Photo of southern portion of the Covered Hazardous Waste Storage Area.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

Photo #T1-09 **City:** Tulsa, OK
Site: Name Industries, Inc. **Time:** 1540

Photo of the northern portion of the Covered Hazardous Waste Storage Area.

Photo By: Photographers Name **Date:** February 24, 1998
Witness: Witness Name **Direction:** SE

PACKAGING AND SHIPPING PROCEDURES - ENVIRONMENTAL SAMPLES

SOP Number: 04-02-00
Effective Date: 04/06/99

Technical Approval: David M. Walker Date: 7/6/99

QA Management Approval: John W Goode Date: 7/15/99

I. SOP Description

This Standard Operating Procedure (SOP) describes the procedures involved in the packaging and shipping of environmental samples.

It is the field team leader's responsibility to determine whether the samples meet the definition of environmental or dangerous goods samples and to follow the appropriate packaging and shipping procedures - SOPs and related guidances. Assistance in determining sample categories can be obtained from senior TechLaw staff/managers.

Definitions: Environmental samples normally include drinking water, most ground water and ambient surface water, soil, sediment, and any samples not containing high levels of hazardous materials or hazardous waste. These types of samples generally are not considered a hazardous waste in 40 CFR 261.3 or hazardous materials under the DOT regulations 49 CFR 171. These sample are taken from areas where high concentrations of constituents are not likely to be found.

Hazardous materials (Dangerous Goods) samples are regulated for transportation under 49 CFR and the International Air Transport Association (IATA) regulations. These types of samples may be classified as a hazardous waste under 40 CFR 261 (Characteristic, i.e., corrosive; or a Listed waste, i.e., K147-tar storage tank residues from coal tar refining). They may also be classified under the DOT and IATA regulations as one of 9 hazard classes (see Sample Category Determination below).

Every effort should be made to determine the category of the sample (environmental or dangerous goods) prior to collection of samples. Use available file information about the site or areas to be sampled. Review any existing analytical data from previous samples collected at the site. Review waste generation data, where wastes have been disposed on site and any waste characteristic information provided by the facility or other sources (e.g., EPA or State agency).

Sample Category Determination:

When making a determination whether samples can be shipped as Environmental samples, ask the following questions:

Does the sample pose an unreasonable risk to health, safety or property when transported in commerce (e.g., is it shock sensitive, does it emit toxic or noxious gases)?;

Does the sample meet the criteria of one or more of 9 UN hazard classes (Attachment A provideS definitions for each class):
Class 1 - Explosive;
Class 2 - Gas;
Class 3 - Flammable liquid;
Class 4 - Flammable solid;
Class 5 - Oxidizer;
Class 6 - Poisonous (toxic);
Class 7 - Radioactive;
Class 8 - Corrosive; and
Class 9 - Miscellaneous dangerous goods

Is the sample material collected on the list of hazardous material in 49 CFR 172.101 Hazardous Materials Table or the IATA List of Dangerous G- Regulations Chapter 4); and,

If samples are collected from a drum, tank, i- area where hazardous waste/materi-l been disposed, these samples L and proceed to SOP No. 04-03-

If any of these cases are true, samples must be sh 03-XX for Dangerous Goods Shipping Procedures

Otherwise proceed with shipping the environmental procedures.

II. General Procedures

Environmental samples of solid waste, soil, air or water collected for the sole purpose of testing to determine its characteristics or composition, are excluded from the requirements of 40 CFR 261-270 when: the sample is being transported to a laboratory for purpose of testing; and the shipper complies with DOT, IATA or other applicable shipping requirements.

The appropriate shipping procedures for Environmental samples are detailed in this SOP.

A. Related SOPs

This SOP is to be used in conjunction with the other relevant or applicable SOPs found in the following SOP categories.

Section No.	Section Title
01	General Standard Operating Procedures
02	General Field Procedures
03	Field Documentation Procedures
04	Packaging and Shipping Procedures
05	Field Equipment Operation and Maintenance Procedures
06	Groundwater Sampling/Monitoring and Analysis Procedures
07	Soil/Sediment Sampling and Analysis Procedures
08	Surface Water Sampling and Analysis Procedures
10	Regulatory Compliance Procedures
11	Quality Assurance Procedures
12	Incineration/BIF Sampling and Analysis Procedures
13	Waste Sampling and Analysis Procedures

B. Related Documentation

The following documents should be used in conjunction with this SOP regarding the packaging and shipment of environmental samples.

- Field Logbook;
- Facility Sampling and Analysis Plan;

- Health and Safety Plan;
- Other relevant facility/site information; and,

III. Procedures for Packaging and Shipping Environmental Samples

The procedures for packaging and shipping environmental samples is split into four sections: Pre-field preparation of the coolers; preparation of sample containers for shipment; preparation of coolers for shipment; and preparation of the shipping documentation.

Prior to any field activities requiring shipments of samples via FedEx or other transportation service (e.g., UPS), contact the shipping company and determine the following: nearest location of the transporters drop-off office to the field activities; and operating hours of the nearest office.

Pre-field Cooler Preparation

(1) Ensure that a sufficient number of coolers have been acquired to allow all samples to be shipped. Use clean insulated coolers and remove all tape, markings, labels, and custody seals remaining on the outside of the coolers. If possible, the coolers should be washed inside and out prior to use.

As a guide, the approximate number of bottles fit in a 54-quart cooler:

Organic Water			***Inorganic Water***
1 liter ambers --	12	or	500 ml poly and/or -- 18 to 20
and 40 ml vials -	6		1 liter poly
	18		

or

Soils
8 oz. glass and 120 ml glass -- 30 to 35

Sample Container Preparation

Once samples have been collected the following steps should be taken in preparing samples for shipment.

(2) Ground-water and surface water environmental samples must be preserved prior to shipment to the laboratory. Refer to SOPs No. 06 and 08 for sample preservation techniques and the project specific Quality Assurance Project Plan (QAPP). Soil and sediment samples do not require preservation (other than ice) prior to shipment.

(3) Label all samples according to the procedures outlined in SOP No. 02-04-XX. Either sample container labels or sample tags may be used.

(4) Place a custody seal on each sample container such that the seal covers both the container lid and the upper portion of the container. This provides for a method of detection of any tampering with the sample.

(5) Wrap each glass bottle with bubble wrap or use bubble wrap bags. Measure out a piece of bubble wrap large enough to surround the entire bottle. The bubble wrap helps protect the sample containers from breakage during transport. Use tape, preferably masking tape, to secure the bubble wrap around the bottle. There is no need to wrap plastic sample containers with bubble wrap.

For VOA sample containers (40 ml vials), spread out a sheet of bubble wrap one or two sheets long. Two vials will be wrapped together using the prepared sheet. Place a vial on each top corner, horizontally, on the width end of the bubble wrap. Starting from the vial end, roll the bottles into the remaining bubble wrap. When complete, bend the long roll into a V, and tape the package with masking tape.

(6) Then, place each sample container (with the exception of very large containers, e.g., one-gallon amber jugs) inside a resealable Ziplock plastic bag (two resealable Ziplock bags may be utilized for the one-gallon amber jars). Custody seal tape may be placed around the bag if additional security is desired. For large containers, if a large Ziplock is not available, wrap the bottle in bubble wrap and place the container in a clean, unused

garbage bag. Tape the opening of the bag closed. A custody seal may be place around the bag if additional security is desired.

Cooler Preparation

(7) Secure and tape the drain plug on the outside of the cooler with fiber or duct tape to prevent leakage from the plug should a sample container or ice bag leak inside the cooler. Then line the cooler with a large heavy duty plastic bag; large plastic garbage bags are commonly used.

(8) Fill the plastic bag with an approximate two inch thick layer of an absorbent packing material, such as asbestos-free vermiculite or perlite. Although commercial packing materials such as styrofoam beads (popcorn) provide for sufficient cushioning, they do not provide ample absorbency in the event of a sample leak and should not be used.

(9) Place each labeled, wrapped and bagged sample container in the cooler in an upright position. The sample bottles should be spaced several inches apart in the cooler so that additional vermiculite can be poured around the bottles. Cardboard separators may also be placed between the sample jars at the discretion of the shipper.

(10) Fill several large (quart or gallon size) plastic bags (e.g., Ziplock bags) with ice and place each bag of ice within a second Ziplock bag. Place the Ziplock side of the ice filled bag, down into the second bag. (Ice bags are double-bagged to prevent water leakage when the ice melts during transit.) Alternatively, 'Blue Ice' (ice packs) may be used to cool the samples. Dry ice should not be used to cool the samples since it is a regulated dangerous good. If dry ice is required for shipment (as in the case of biological tissue sample shipment), the IATA Dangerous Goods Regulations or SOP 04-03-XX should be consulted for the proper packing and shipping instructions.

Place the ice bags around the sample containers inside the large outer plastic (garbage) bag to keep the samples cool during shipment. Fill the remainder of the cooler with vermiculite. Remember to place a temperature blank into the cooler prior to sealing and shipping (see project specific QAPP for applicability). Twist the top of the plastic bag and tape

shut with strapping tape or duct tape to prevent spillage of vermiculite during shipment.

(11) Complete the Chain-of-Custody form and place it along with the necessary sample documentation forms (i.e., chain-of-custody, Contract Laboratory Program Traffic reports etc.,) inside a Ziplock plastic bag. The procedures for completing the Chain-of-Custody paperwork are discussed in SOP Nos. 02-05-XX. Tape the plastic bag containing the paperwork to the underside of the cooler lid. Close the cooler lid and tape the cooler latch shut to prevent accidental opening during shipment.

(12) Then wrap each end of the outside of the cooler with filament strapping tape such that it cannot be opened during shipment. Normally, the tape is wound around the outside of the cooler for a total of three (3) turns, at both ends of the cooler. Up to two custody seals should be affixed to each side of the cooler across the lid opening so that the cooler cannot be opened without breaking the seals. Place the seals over the last wind of the strapping tape. To prevent the accidental tearing of the seal during shipment, it is advisable to place clear packaging tape over the seal. This ensures that the custody seal is firmly affixed to the cooler, yet it can be seen through the thin layer of tape.

Shipping Paperwork Preparation

(13) If shipping by air, obtain a standard FedEx airbill. If shipping samples for a government client, use a TechLaw Government FedEx account number.

(14) Attach a label marked as FROM:, containing the name and address of the shipper to the outside of the cooler lid in the upper left hand corner. In the right hand upper or lower corner of outside cooler lid, place another label marked as TO:, containing the name, address and contact person of the recipient of the cooler. These labels are attached to the cooler as added security incase the FedEx label becomes separated from the cooler. See Diagram A for a visual example.

(15) Complete the shippers airbill with the appropriate information. Be sure to include a TechLaw Work Assignment task or job number in the FedEx

box labeled for 'Internal Billing Reference Information'. See Attachment B for an example. FedEx will complete the information related to the weight of the package. Once completed, affix a FedEx plastic Airbill pouch to the outside, center of the cooler lid. (FedEx now has airbills that that affix to cooler handles.) Slip the completed FedEx airbill into the pouch. Do not seal the pouch. Make sure you pull the top copy of the FedEx airbill before relinquishing the cooler to FedEx.

IV. Health and Safety Section

It is TechLaw's policy to maintain an effective program for control of employee exposure to chemical, radiological, and physical stress which is consistent with the EPA, DOE, and OSHA established standards and requirements.

All field personnel will be provided with appropriate protective clothing and safety equipment. At a minimum, this will include steel-toed shoes, safety glasses, and chemical-resistant gloves.

Refer to a site-specific health and safety plan for detailed health and safety procedures. This plan should be reviewed prior to beginning any work.

V. QA/QC Section

Prior to sealing coolers, the Team Leader should check all paperwork, address labels and shipping documents for accuracy.

Any deviations in preservation techniques should also be documented in the field logbook and justified. Deviations are to be sufficiently documented to allow repetition of the activity as acutally performed.

VI. Comments/Notes

Prior to commencing field activities, ensure that appropriate equipment is readied for the activities. In addition, obtain the location, phone number and office hours of the FedEx office nearest to the field activity site.

VII. Attachments

Attachment A: UN Class Definitions.
Attachment B: Sample FedEx Airbill
Diagram A: Visual example of labled cooler.

VIII. References

International Air Transport Association (IATA), Dangerous Goods Regulations, Effective from 1/1 to 12/31 of each year.

U.S. Environmental Protection Agency, A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, Washington, D.C., 1987.

U.S. Environmental Protection Agency, Characterization of Hazardous Waste Sites - A Methods Manual, EPA/600/4-84/075, April 1985.

U.S. Environmental Protection Agency, Region IV, Environmental Services Division Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual (ECBSOPQAM), February 1, 1991.

U.S. Environmental Protection Agency, RCRA Groundwater Monitoring Technical Enforcement Guidance Document, OWSER-9950.1, September 1986.

TechLaw, Inc., Quality Assurance Program Plan (as amended for the RCRA Enforcement, Permitting and Assistance Contract).

HAZARD CLASS DEFINITIONS

CLASS 1 - EXPLOSIVES

Definition

Class 1 comprises:

(a) explosive substances, except those whose predominant hazard should be in another class;

(b) explosive articles, except devices containing explosive substances in such a limited quantity or of such a character that their inadvertent or accidental ignition or initiation, during transport, will not cause any manifestation of projection, fire, smoke, heat or loud noise external to the device; and

(c) articles and substances not mentioned above which are manufactured with a view to producing a practical explosive or pyrotechnic effect

To be considered for air transport, the purity, stability, sensitivity (including sensitivity to vibration, temperature cycling and pressure variation) and other physical properties of all explosives, whether or not contained in a contrivance, must comply with these Regulations.

A "new explosive article or substances" is considered to be any of the following:

- a new explosive substance, or combination or mixture of explosive substances, which is significantly different from substances or mixtures previously approved; of each of these compatibility groups together with the hazard groups which contain articles and/or substances of the group.
- a new design of an explosive article, or an article containing a new explosive substance or a new combination or mixture of explosive substances;
- a new design of package for an explosive article or substance including a new type of inner packaging.

Class 1 is divided into six divisions:

Division 1 - Articles and substances having a mass explosion hazard.

Division 2 - Articles and substances having a projection hazard but not a mass explosion hazard.

Division 3 - Articles and substances having a fire hazard and either a minor blast hazard or both, but not a mass explosion hazard. This division comprises articles and substances that:

- give rise to considerable radiant heat, or
- burn one after another, producing minor blast and/or projection effects.

Division 4 - Articles and substances having no significant hazard (only a small hazard) in the event of ignition or initiation during transport. The effects are largely confined to the package and no project of fragments of appreciable size or range is to be expected. An external fire must not cause practically instantaneous explosion of virtually the entire contents of the package.

Articles and substances in this division are in Compatibility Group S when they are so packaged or designed that any hazardous effects arising from accidental functioning are confined within the package; if the package has been degraded by fire, all blast or projection effects are limited to the extent that they do not significantly hinder fire-fighting or other emergency response efforts in the immediate vicinity of the package.

Division 5 - Very insensitive substances, having a mass explosion hazard, which are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport. As a minimum requirement they must not explode in the fire test.

Division 6 - Extremely insensitive articles which do not have a mass explosion hazard.

This division comprises articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

CLASS 2 - GASES

Definition

A gas is a substance which:

- at 50°C (122°F) has a vapour pressure greater than 300 kPa (3.0 bar, 43.5 lb/in^2); or
- is completely gaseous at 20°C (68°F) at a standard pressure of 101.3 kPa (1.01 bar, 14.7 lb/in^2)

The transport condition of a gas is described according to its physical state as:

- Compressed gas - a gas (other than in solution) which, when packaged under pressure for transport, is entirely gaseous at 20°C (68°F);
- Liquefied gas - a gas which, when packaged for transport, is partially liquid at 20°C (68°F);
- Refrigerated liquefied gas - a gas which, when packaged for transport, is partially liquid because of its low temperature;
- Gas in solution - compressed gas, which when packaged for transport, is dissolved in a solvent.

Class 2 gases are assigned to one of three divisions based on the primary hazard of the gas during transport:

Division 1 - Flammable gas: Gases which at 20°C (68°F) and a standard pressure of 101.3 kPa (1.01 bar, 14.7 lb/in^2):

- are ignitable when in a mixture of 13% or less by volume with air; or
- have a flammable range with air of at least 12 percentage points regardless of the lower flammable limit. Flammability must be determined by tests or by calculation in accordance with methods adopted by ISO (see ISO Standard 10156:1990). Where insufficient data are available to use these methods, tests by a comparable method recognized by the appropriate national authority must be used.

Division 2 - Non-flammable, non-toxic gas: Gases which are transported at a pressure not less than 280 kPa at 20°C, or as refrigerated liquids, and which;

- are asphyxiant - gases which dilute or replace the oxygen normally in the atmosphere; or
- are oxidizing - gases which may, generally be providing oxygen, cause or contribute to the combustion of other material more than air does; or
- do not come under the other divisions.

Division 3 - Toxic gas: Gases which

- are known to be so toxic or corrosive to humans as to pose a hazard to health; or
- are presumed to be toxic or corrosive to humans because they have an LC_{50} value equal to or less than 5000 mL/m^3 (ppm) when tested.

Note: Gases meeting the above criteria owing to their corrosivity are to be classified as toxic with a subsidiary corrosive risk.

Class 2 also includes "aerosols." For the purpose of these regulations, an aerosol means any non-refillable receptacle made of metal, glass or plastic and containing a gas compressed, liquefied or dissolved under pressure, with or without a liquid, paste or powder, and fitted with a self-closing release device allowing the contents to be ejected as solid or liquid particles in suspension in a gas, as a foam, paste or powder, or in a liquid or gaseous state.

CLASS 3 - FLAMMABLE LIQUIDS

Definition

This class has no subdivisions. It comprises liquids or mixtures of liquids or liquids containing solids in solution in suspension which give off a flammable vapour at temperatures of not more than 60.5°C (141°F) closed-cup test or not more than 65.6°C (150°F) open-cup test.

Flammable liquids are assigned to packing groups according to the flash point and the boiling point of the liquid.

Viscous flammable substances, such as paints, varnishes, enamels, lacquers, adhesives and polishes, having a flash point below 23°C (73°F) are normally assigned to Packing Group II but they may be assigned to Packing Group III by taking the following criteria into consideration:

- the closed-cup flash point;
- the viscosity expressed as the flow time in seconds;
- a solvent separation test;
- the size of the receptacle; and
- the presence of other hazards.

CLASS 4 - FLAMMABLE SOLIDS; SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION; SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES

Class 4 is divided into three divisions as follows:

Division 1 - Flammable solids

Definition: Flammable solids. Solids which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction; self-reactive and related substances which are liable to undergo a strongly exothermic reaction; desensitized explosives which may explode if not diluted sufficiently. Division 1 contains:

- flammable solids;
- self-reactive and related substances;
- desensitized explosives.

Flammable solids are readily combustible solids and solids which may cause fire through friction. Readily combustible solids are powdered, granular or pasty substances which are dangerous if they can be easily ignited by brief contact with an ignition source, such as a burning match, and if the flame spreads rapidly. The danger may not only come from the fire but also from toxic combustion products. Metal powders are especially dangerous because of

the difficulty of extinguishing a fire since normal extinguishing agents such as carbon dioxide or water can increase the hazard.

Division 2 - Substances liable to spontaneous combustion

Definition: Substances liable to spontaneous combustion. Substances which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up in contact with air, and being then liable to catch fire.

Two types of substances can be distinguished with spontaneous combustion properties:

- Pyrophoric substances - substances (liquid or solid) including mixtures and solutions which, even in small quantities, ignite within 5 minutes of coming in contact with air. These substances are the most liable to spontaneous combustion;

- Self-heating substances - solid substances which generate heat when in contact with air without an additional energy supply. These substances will ignite only in large amounts (kilograms) and after long periods of time (hours or days).

Division 3 - Substances which, in contact with water, emit flammable gases (Dangerous when wet.)

Definition: Substances which, in contact with water, emit flammable gases (Dangerous when wet.) Substances which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

CLASS 5 - OXIDIZING SUBSTANCES AND ORGANIC PEROXIDES

Class 5 is divided into two divisions:

Division 1 - Oxidizing substances are substances which, in themselves are not necessarily combustible, but may generally cause or contribute to the combustion of other material by yielding oxygen.

Division 2 - This division is made up of organic substances which contain the bivalent structure -O-O- and may be considered derivatives of hydrogen peroxide in which one or both the hydrogen atoms have been replaced by organic radicals.

Note: Hydrogen peroxide is made up of two hydrogen atoms and two oxygen atoms connected in a chain thusly: H-O-O-H.

Organic peroxides are thermally unstable substances which may undergo exothermic, self-accelerating decomposition. In addition, they may have one or more of the following properties:

- be liable to explosive decomposition;
- burn rapidly;
- be sensitive to impact or friction;
- react dangerously with other substances;
- cause damage to the eyes.

CLASS 6 - POISONOUS (TOXIC) AND INFECTIOUS SUBSTANCES

Class 6 is divided into two divisions as follows:

Division 1 - Poisonous (toxic) substances are substances which are liable to cause death or injury or to harm human health if swallowed, inhaled or contacted by the skin.

Poisonous substances, including pesticides, must be assigned to packing groups referred according to the degree of their toxic hazards in transport. In assigning the packing group, account has been taken of human experience in instances of accidental poisoning, and of special properties possessed by an individual substance, such as liquid state, high volatility, any special likelihood of penetration, and special biological effects. In the absence of human experience the grouping has been based on the available data from animal experiments. When a substance exhibits a different order of toxicity by two or more routes of administration, the highest degree of toxicity must be used to assign the packing group. When a substance exhibits a different order of toxicity by inhalation of mists and by inhalation of vapours, the highest degree of toxicity must be used to assign the packing group.

Liquids having a vapour inhalation toxicity of Packing Group I are forbidden on both passenger and cargo aircraft.

Note: In these regulations "toxic" has the same meaning as "poisonous."

Division 2 - Infectious Substances. Substances containing viable micro-organisms including a bacterium, virus, rickettsia, parasite, fungus, or a recombinant, hybrid or mutant, that are known or reasonably believed to cause disease in animals or humans.

- Biological products - Those substances which meet one of the following criteria:
  - finished biological products for human or veterinary use manufactured in accordance with the requirements of national public health authorities and moving under special approval or license from such authorities;
  - finished biological products shipped prior to licensing for development or investigational purposes for use in humans or animals;
  - finished biological products for experimental treatment of animals, and which are manufactured in compliance with the requirements of national public health authorities.

CLASS 7 - RADIOACTIVE MATERIAL

For the purposes of these regulations, a radioactive material is any article or substance with a specific activity greater than 70 kBq/kg (0.002 μCi/g).

CLASS 8 - CORROSIVES

Definition: Substances which, in the event of leakage, can cause severe damage by chemical action when in contact with living tissue or can materially damage other freight or the means of transport.

The test criteria for the three packing groups in this class are:

- Packing Group I - (substances presenting great danger) - substances that cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of three minutes or less;

- Packing Group II - (substances presenting medium danger) - substances that cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of more than 3 but not more than 60 minutes;

- Packing Group III - (substances presenting minor danger) - substances that cause visible necrosis of the skin tissue at the site of contact when tested on the intact skin of an animal for a period of more than 60 minutes but less than four hours, or substances which are judged not to cause visible necrosis in human skin but which exhibit a corrosion rate on steel or aluminum surfaces exceeding 6.25 mm a year at a test temperature of 55°C (130°F).

CLASS 9 - MISCELLANEOUS DANGEROUS GOODS

Definition: Substances and articles which during air transport present a danger not covered by other classes. Included in this class are: Other regulated substances, Magnetized material and miscellaneous articles and substances.

Other Regulated Substances: A liquid or solid which has anaesthetic, noxious or other similar properties which could cause extreme annoyance or discomfort to passengers and/or flight crew members.

Magnetized Material: Any material which, when packed for air transport, has a magnetic field strength of 1.59 A/m (0.002 gauss) or more at a distance of 2.1 m (7 ft) from any point on the surface of the assembled package (see also Packing Instruction 902, which includes methods of determining magnetic field strength).

Miscellaneous articles and substances:

- Asbestos
- Dry-Ice
- Environmentally hazardous substances
- Life-saving appliances
- Engines, internal combustion
- Polymeric beads
- Battery-powered vehicles
- Wheelchair, electric
- Zinc dithionite.

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5 Packaging ☐ FedEx Letter ☐ FedEx Pak (Declared value limit $500) ☐ FedEx Box ☐ FedEx Tube ☒ Other Pkg

6 Special Handling

Does this shipment contain dangerous goods? ☐ Yes (No per attached Shipper's Declaration) ☐ Yes (Shipper's Declaration not required)

☐ Dry Ice (Dry Ice, 9, UN 1845) x kg (Dangerous Goods Shipper's Declaration not required)

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ATTACHMENT B

SOP Number: 04-02-00
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SAMPLE COOLER